Hive - A Digital Product System for Shared-Use Makerspaces and Workshops

Research Thesis

In partial fulfillment of the requirements for graduation with research distinction in Industrial Design in the undergraduate colleges of The Ohio State University

by

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Benjamin Mosher | Industrial Design Senior Thesis | AU 2020

abstract

"Products" as we understand them within the design discipline, can be categorized into two general groupings; products predominantly used by a sole individual, and products shared amongst many users. Exploring this idea alongside the developing "Access vs. Ownership" approach to design, evokes questioning into what Industrial Design can do to make shared-use work better for all stakeholders involved.

Makerspaces; a blanket term for workshops, fab-labs or any shared workspace meant for hands-on creation, are a unique example of an access-based shared-use ecosystem. With a 2,300% increase in the number of makerspaces existing globally since 2006, and nearly every major higher-education institution offering some type of shared-use workshop facility; makerspaces provide a far-reaching opportunity to design systems that empower the stakeholders operating within shared-use contexts.

The stakeholders within this context can be divided into two general groups, student-users and administrators. The student-user category captures all students within university makerspace facilities, as well as any non-instructor, general user found within a makerspace not associated with an educational institution. The administrator category includes shop-managers, facility instructors, lab-techs and staff. The success of this project necessitates the development of a solution that improves the experience, efficiency and value prospect for both user groups identified above.

Hive is a product system rooted in a digital app interface designed for any smartphone with NFC capability, while also serving as the operating system for hive HQ, a proprietary smart device designed for use by facility administrators. The hive system seeks to streamline knowledge seeking, reinforce safety practices, and efficiently manage equipment usage for student-users, while improving facility organization, managing logistics, and empowering administrators to deliver effective and efficient educational value to the students they oversee.

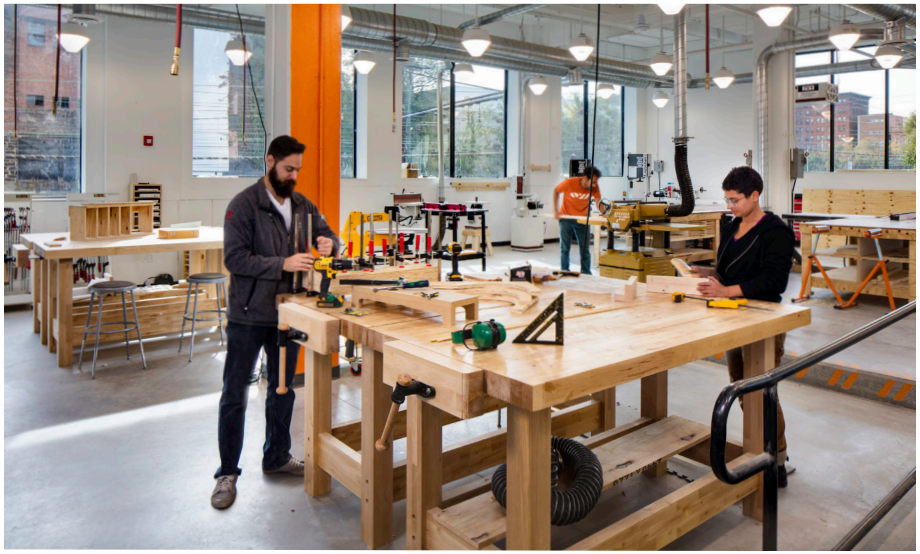
background

This project was developed over the course of the Autumn 2020 semester, following a split course structure whereby the initial six weeks were dedicated to high-level research exploration, followed by research application and concept development occupying the remaining portion of the term. My area of interest going into the semester centralized around Access vs. Ownership, product sharing, and user experience within a shared-use ecosystem. I conducted a broadly-reaching exploratory research phase, formalized by a class-wide online blog platform that was organized by our program advisor, Dr. Sebastien Proulx. Within this research phase I explored a variety of sub-topics to build a wide breadth of knowledge in the shared-use landscape, prior to finalizing a concrete design objective. Some topics explored include; the sharing economy, behavioral economics, knowledge acquisition, ownership, social exchange, and product use within a community.

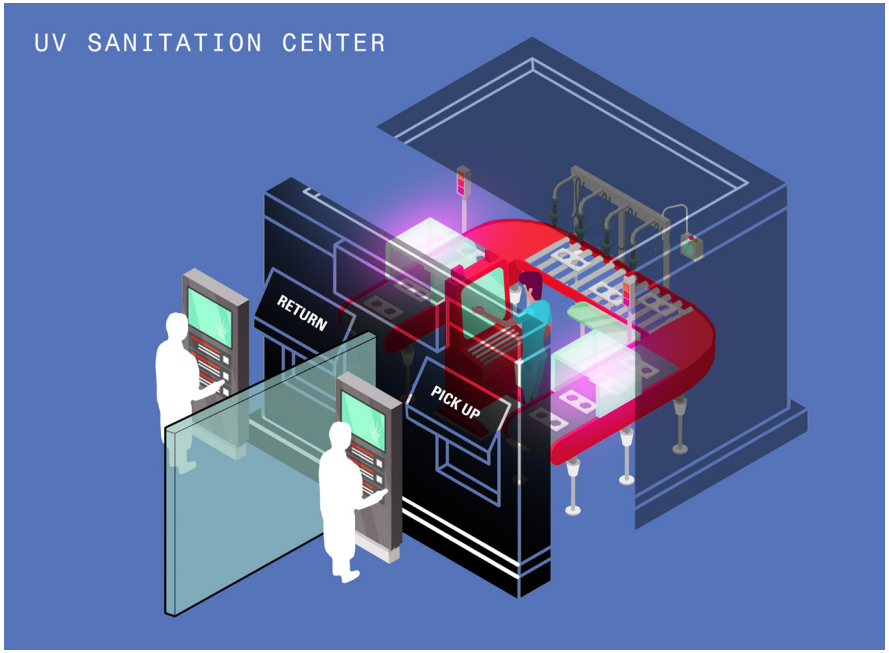
Following this stage of topic exploration and high level background research, I conducted an online survey with over 100 participants, focusing mainly on the sharing economy and consumer behavior. While the focus of this survey is loosely connected to the design project actualized later in the semester, it served as a valuable asset to my understanding of how users perceive shared-use and ownership, as well as the types of products they have borrowed or shared. A key takeaway from this survey was that, of products the survey participants had borrowed or shared, tools were among the most common, following "books & digital media".

Going into the concept development stage of the semester, I needed to define a concrete design objective rationalized within a tangible context. With "shared use" as the fundamental basis for this project, I still needed to identify a product category and user-context to give shape to the project. Pulling from my survey, I decided to move forward with "tools" as the general product category to design within, as I have developed an intimate understanding of the nuance involved with tool design and user experience, through my 2 year Industrial Design internship at Stanley Black & Decker Inc. Upon landing on this direction to move forward with, I conducted an informal interview with my boss Craig Steinfels, the Industrial Design Director at SBD, on the subject of sharing tools and learning how to use them. The most profound takeaway from this discussion was an insight Craig offered as a lesson gathered from years of conducting field research and user testing; "The most substantial barrier to entry we find with new users is their lack of knowledge about which tool to buy and how it will help them to do the specific job they have in mind".

This conversation got me thinking about the ways by which a user learns to use tools. I began doing some secondary research and mapped out three general routes; learning from an experienced domestic figure (i.e. parent, grandparent, older sibling), learning online (i.e. YouTube), or learning from an instructor in a shared use workspace (i.e. school woodshop or makerspace). It was at this point in drawing connections between everything done so far in the semester, I realized that designing for shared-use environments necessitated equal consideration for both the sharing of equipment, and the sharing of knowledge from teacher to student; a concept embodied by the makerspace ecosystem.



exploratory research: conjectures



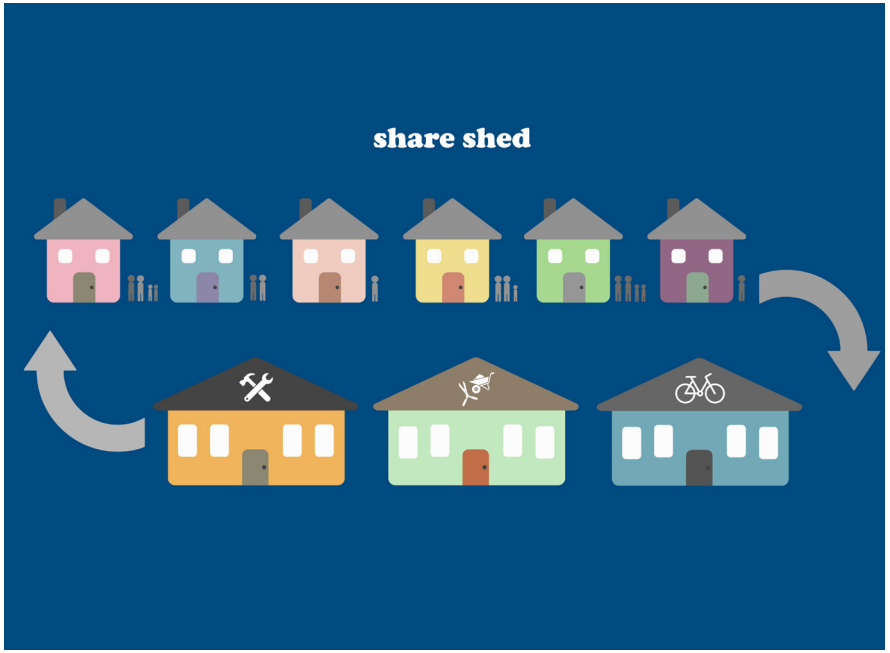
Sanitation Center

This concept illustrates a check out and return station for rented goods that need sanitized between individual users. The key takeaway from this exploratory conjecture is the process of automated return and rental. Through automation of the logistics, shared use can be streamlined and orchestrated by a computer system.

Tool Vending Machine

This concept illustrates a vending machine style tool rental system that can be self operated and available to patrons of grocery stores, convenience stores or hardware stores alike. The most informative takeaways from this conjecture are the ability to access tools conveniently, and at a centrally shared location.

exploratory research: conjectures



Share-Shed

This concept highlights community sharing, and a system of collectivism within a neighborhood. The key takeaway from this conjecture is the need to establish equal responsibility and respect for the items shared amongst the community. This informed many of the features integrated in the hive system.

Access vs. Ownership Ad Campaign

This conjecture illustrates a symbolic message about the power in access, and its advantages over individual ownership. The takeaway from this concept that most informed the project going forward, is the idea that access to knowledge and information is arguably a more valuable asset than access to things.

secondary research: **context**

"A makerspace is a collaborative work space inside a school, library or separate public/private facility for making, learning, exploring and sharing that uses high tech to no tech tools" (2)

"Maker spaces go beyond the traditional machine shop environment familiar to the undergraduate curriculum offering access to rapid prototyping equipment and conceptual design spaces coupled with a unique culture that can be transformative to its users" (1)

"We use the term "academic makerspace" to describe the facility, staff, resources, and associated community that support creating, learning, and fabricating in an academic setting" (3)

The size of higher education academic makerspaces ranges from 100 to over 1,000 active members... In addition to the availability of design and fabrication tools such as 3-D printers, laser cutters, mills, sewing machines, and soldering irons, higher education academic makerspaces also provide training in the use of these traditional and digital tools." (3)

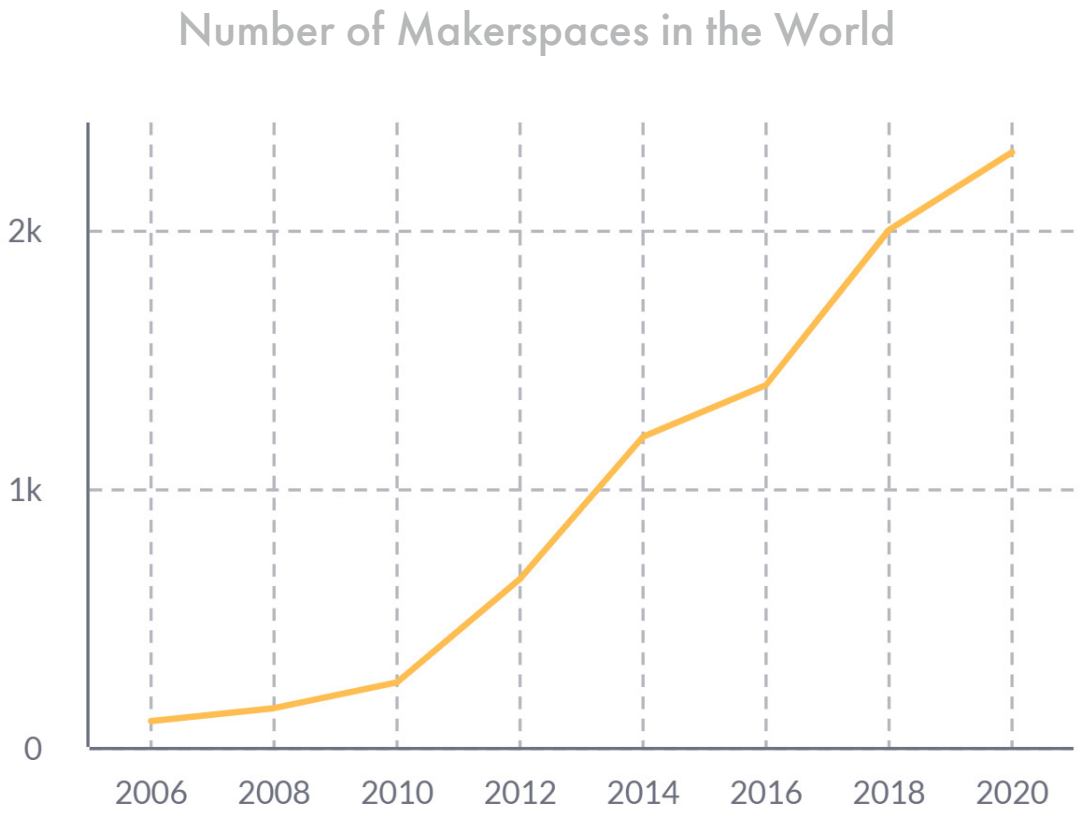
secondary research: **context**

The Scope

With most large universities establishing some type of makerspace in the past decade, the opportunity for intervention is fresh and widespread.

Beyond educational institutions, makerspaces of all types have been popping up around the world, resulting in a **23x increase** in the number of maker spaces globally from 2006 to 2020. There are approximatley 2,300 currently in operation.

Data sourced from:
Popular Science 2016 (4) &
Entrepreneurship Research Journal (5)



secondary research: sources

1. Forest CR, Moore RA, Jariwala AS, et al. The Invention Studio: A University Maker Space and Culture. Advances in Engineering Educaiton. 2014;4(2):1-32

2. "What Is a Makerspace? ." Makerspaces.com, 15 Mar. 2017, www.makerspaces.com/what-is-a-makerspace/

3. Wilczynski, Vincent, et al. "The Value of Higher Education Academic Makerspaces for Accreditation and Beyond." Planning for Higher Education Journal, 2017.

4. Lou, Nicole, and Katie Peek. "By The Numbers: The Rise Of The Makerspace." Popular Science, 2016, www.popsci.com/rise-makerspace-by-numbers/

5. Halbinger, Maria A. "The Relevance of Makerspaces for University-Based Venture Development Organizations." Entrepreneurship Research Journal, vol. 10, no. 2, 2020

primary research: **experts**

Stanley Black & Decker Industrial Design + Vocational School Graduate

Ben Wulker | Matt Seibert | Josue Campos
Jordan Greene | Jeff Forsythe

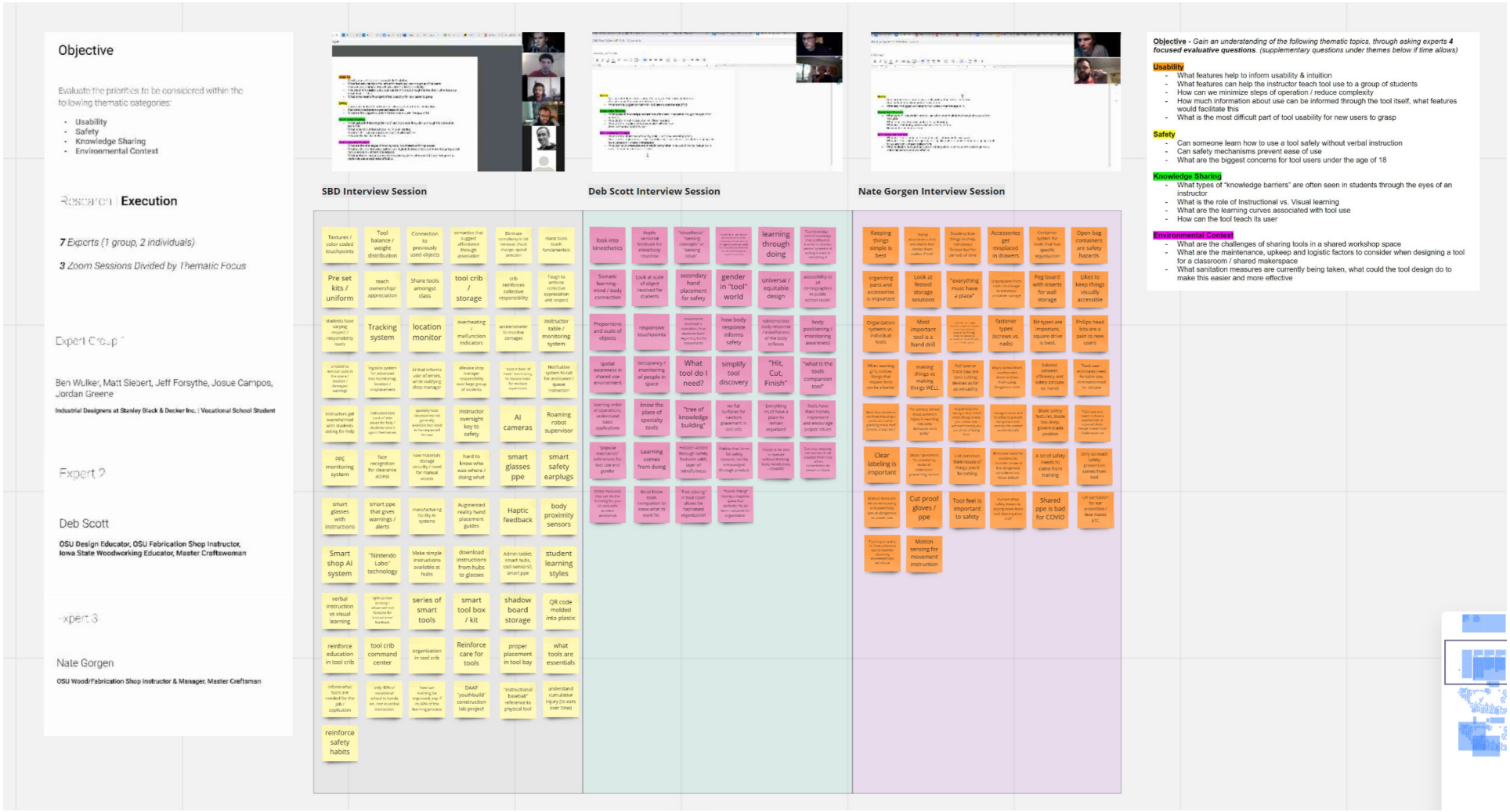
Design + Fabrication Educator + Master Woodworker

Deb Scott

OSU Woodshop Manager, Fabrication Expert + Master Craftsman

Nate Gorgen

primary research: generative exploration

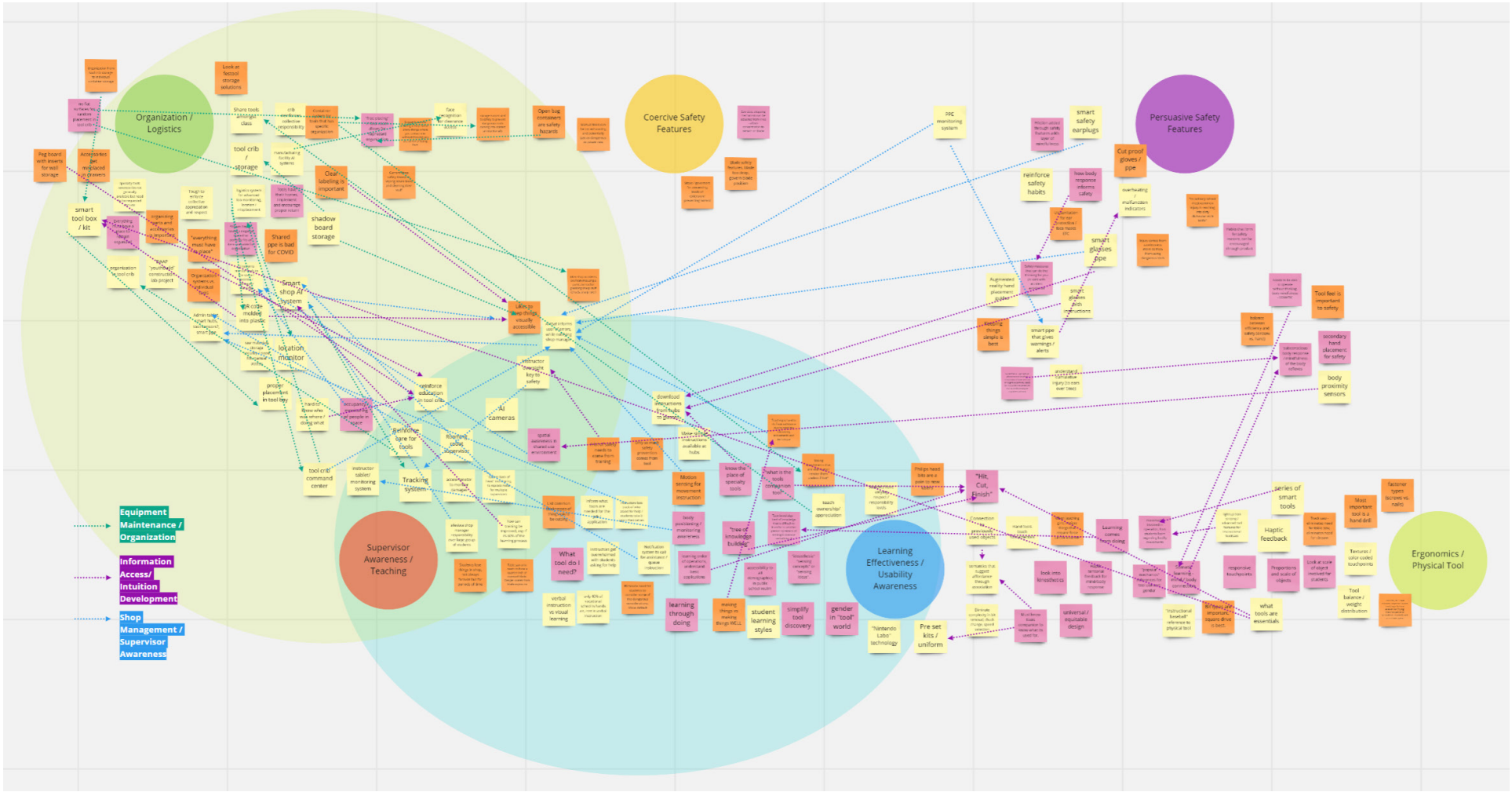


My first step in gaining a more focused understanding, was to conduct generative research about the topic at large, through a series of 3 individual expert sessions via Zoom video call. Prior to the sessions, I generated a list of questions within 4 categories of interest; Safety, Usability, Environmental Context, and Knowledge Sharing. I recorded the sessions and played them back to capture notes that were later organized onto virtual sticky notes in Miro. This served as a starting point for refining my direction.

primary research: generative sort

With the sticky-notes color coded by corresponding expert, and each one capturing a key point mentioned during their respective sessions, the next step was to identify common themes. The primary themes I defined were, Organization/Logistics, Supervisor Awareness, Coercive Safety Features, Persuasive Safety Features, Learning Effectiveness / Usability, and Ergonomics. I decided upon these key themes as they best summarized the content of the input gathered. I then looseley sorted the individual sticky notes in proximity to the themes they most closesly fit within, positioning them between themes if the subject matter was shared. This wasn't an exact science, but helped me to better understand the breadth of input collected from my experts, and how each piece of content gave shape to broader themes. From here I sought to further rationalize and organize my findings.

primary research: generative sort



Following the initial sortation, my next step was to identify connections between themes and findings from each of the individual participants. Again, in a loosely structured fashion, I drew lines between notes I though complemented eachother, or spoke to a larger concept. The color of the lines drawn between notes were coded to represent specific aspects of connection that I sought to explore, defined as “Equipment Maintanence/ Organization”, “Information Acess/ Intuition Development”, and “Shop Management/Supervisor Awareness”. This exercise helped me to focus in on an area of opportunity from which I could begin brainstorming concepts of intervention.

primary research: key takeaways

Organization is a struggle, especially when multiple students ask for help at once

It can be hard to keep track of training requirements which pose safety and liability concerns

It is very important to establish safety habits and PPE usage

It can be hard to manage equipment when people have different levels of respect for the organization and condition of shared tools

It can be dangerous when people decide to “wing it” because they don’t feel like waiting for assistance

concept development: design brief

context

Makerspaces are set up to provide equal access to equipment and knowledge for all users alike. The stakeholders of these shared-use environments, defined as either student-users or administrators, are subject to a number of unique challenges involving organization, logistics, safety, efficiency and educational effectiveness.

challenges: administrator

Equipment gets damaged, misplaced or used by students who aren't trained.

Help requests are hard to manage and contribute to stress on facility staff / instructors

Liability concerns stem from mis-steps in safety training, student unawareness, and inability to keep track of all personell clearance

challenges: student user

It can be difficult to ask for help in a busy workspace, quick questions can be tough to get answered efficiently

Training qualification records can be disorganized and result in confusion and liability

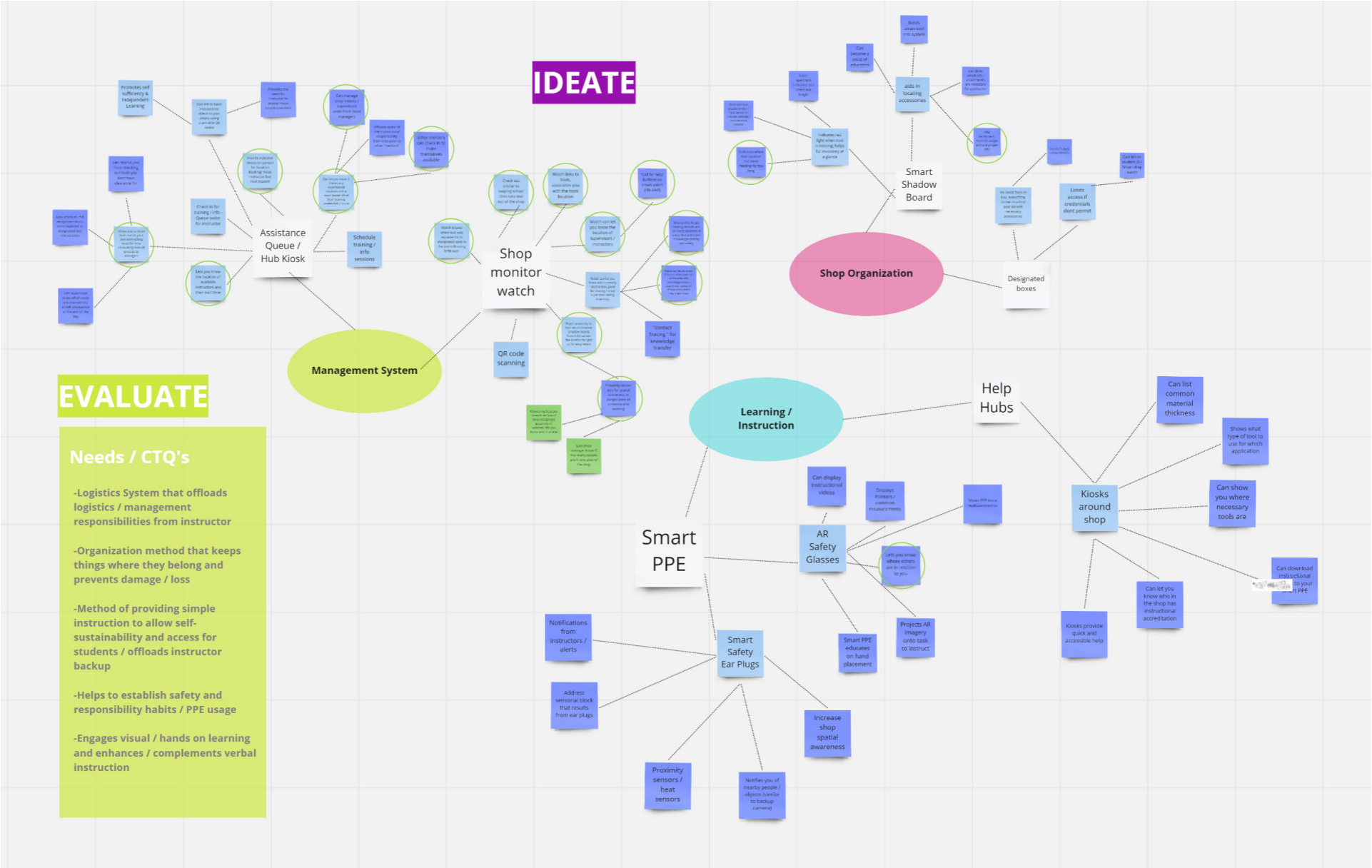
Students need to develop good safety practices before they "learn the hard way"

concept development: design brief

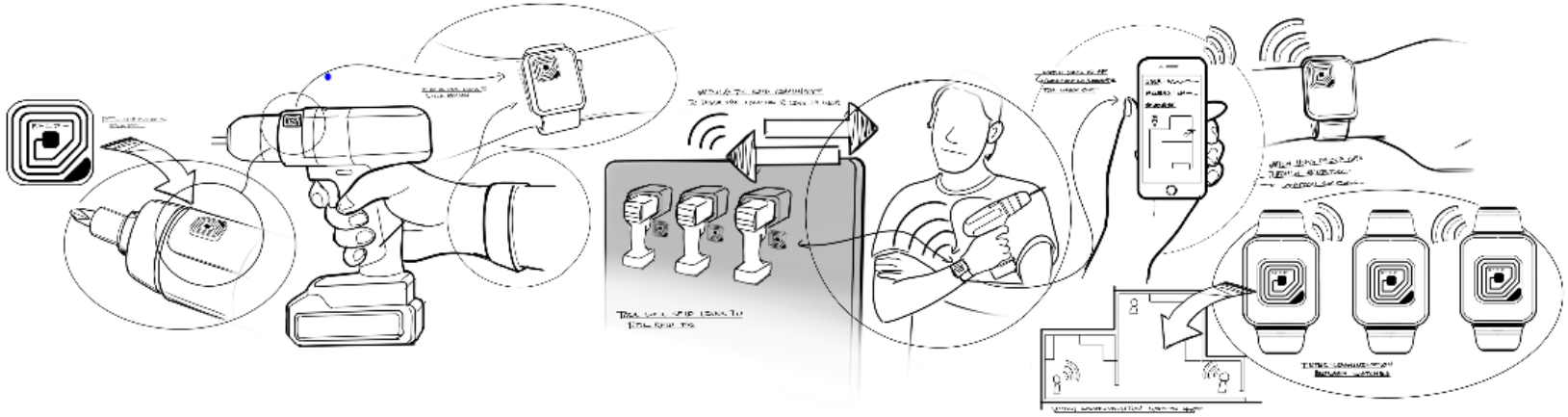
Objective

Design a system~product that benefits the community of users within a shared makerspace by proliferating efficiency, access, organization and education in a way that addresses the specific challenges faced within a shared-use context.

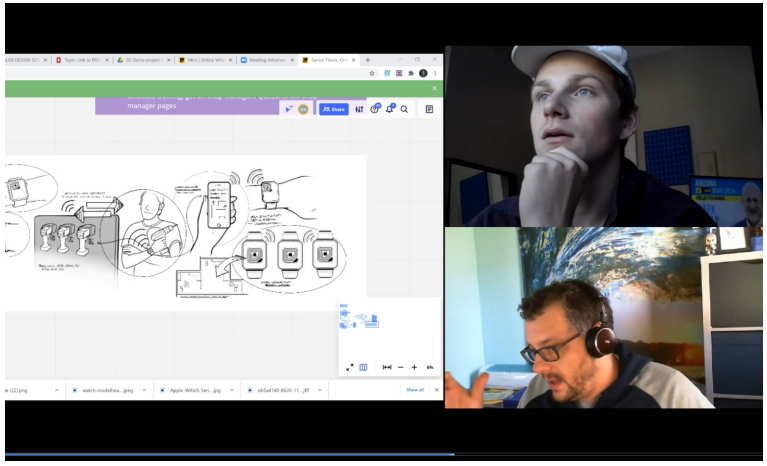
concept development: brainstorm



evaluative research: initial concept



After completing an individual brainstorm session, I sketched out a rough visualization of the concept I would present to my experts in an effort to get an evaluative assessment on my proposed direction. This concept was essentially an NFC based watch system that sought to manage organization and inventory by linking the user's watch location to the NFC chip placed on the tool they were using at any given time. This would hopefully offer a simple way to offload inventory management responsibilities from the facility manager, while promoting a sense of accountability as the user is directly liable for the equipment in use. I would then go on to present this concept to my experts.



evaluative research: assessment

EVALUATE

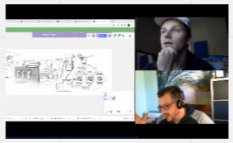
Evaluative Assessment Questions

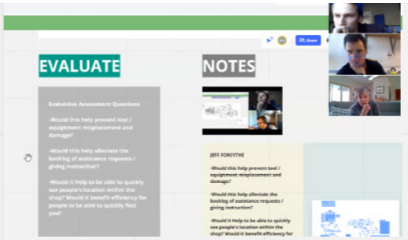
-Would this help prevent tool / equiptment misplacement and damage?

-Would this help alleviate the backlog of assistance requests / giving instruction?

-Would it Help to be able to quickly see people's location within the shop? Would it benefit efficiency for people to be able to quickly find you?

NOTES





JEFF FORSYTHE Feedback

Simple RFID Band like Cedar Point Fast Trak, cheap and simple

Large screen queue list in shop, centralized

Attendance, clock in clock out (keeps instructor aware of who is present)

Be careful about liabilities with tool usage off site

PPE, safety glasses etc. Touch sensor on glasses, ensures user is protected before using tools. How could this reinforce PPE measures?

Super important to reinforce fundamentals and safety so they don't have to learn "the hard way"

References personal experience about severe chronic back injury because of a mistake he made when he was 19 in auto repair school

Pillars of importance - Accountability, Safety, Execution

Proliferation of accessible tutorials, Youtube, Skillshare etc.

NATE GORGEN Feedback

Watches pose an issue. Each person would have to have one. (expensive and difficult)

Could the watch be skipped and affordances put into mobile app

RFID is good and cheap but the life span isn't super long. Works for RFID tags

Validates that knowing where people are around the shop is good for metrics and planning (management side value)

Would help with misplacement

Interest in the "more experienced users" ecosystem from an educational / peer involvement idea, although it would need to be cleared by shop management to ensure the credentials are actually there

Could it just be something they have in their pocket

There needs to be something with the RF transponder. This cant be done with phone.

RF transponder doesn't need a battery which makes them small and easy, but they need to be replaced which is fine because they're cheap

Having a queue is good because he often gets overwhelmed with people asking him for help and losing track, not able to find people. More efficient for students as well

Likes the idea of having data points with tool check out and who is using what. Has value for management

Would be a helpful tool in access / monitoring who is trained and certified

Excited by the idea in general!

DEB SCOTT Feedback

Would help with tool placement, and could avoid damage if assistance component is successful.

Can it connect you to information in app about basic information / instruction. "Somewhere in between nate and cohort - complements instructional access"

Could help alleviate backlog of help requests. Could there be a queue system, alert to Nate ("talk to deb" system from class)

Validates that being able to see location and find people could be helpful

CONCERN WITH WATCH - Shop safety practices requires removal of all jewelry. Could damage watch or person, violates safety principles

Liability if its distributed by school. Jewelry / wearable is a no go. Principle is good but the form factor is not going to work

Screen would need to be on app or on a large scale hub screen

App should hold most of the info

Should not aim to provide an alternative to shop manager / instructor (Nate) it would need to be a complement

Doesn't like the idea of placing instructional liability on other students regardless of experience. Liability issue and issue in inconsistency of instruction

What are the identities, certified / not certified. Distinction in the identities relevant to shop ecosystem

"tool becomes more problematic with the more things it tries to do"

Who is this for? try to hone in on one thing rather than trying to do multiple things at the same time. Is this more for education or for shop management

Excited by the idea in general!

TAKEAWAYS

Rethink form factor - cannot be wearable that could cause danger

Utilize RFID, keep cost effective as these will need to be replaced

Management assistance is good for keeping structure in a shared ecosystem. Let supervisor know who is present, where they are ETC

Reinforce PPE Usage / safety (when you grab your first tool, phone pings a reminder to wear PPE)

Knowing where tools are, keeping shared equipment organized is important

Should indicate who is certified / trained for shop management purposes. Remove the whole peer to peer thing, too many liabilities

Have a help request queue. benefits efficiency for instructor and student, extra helpful in combination with location feature

Likes idea of data points for how frequently tools are used. can predict maintenance check ups, popularity etc.

App feature to link to basic instructions about the tool

evaluative research: summary + reflection

My evaluative assessment process consisted of two separate sessions, involving 3 of the original expert participants. Jeff Forsythe, an Industrial Designer and coworker at Stanley Black & Decker Inc. was the participant in session 1. Of the pool of designers from SBD that participated in the original generative research session, Jeff was the most engaged and insightful, primarily because of his personal first-hand experience that set him apart from the group. Prior to completing his Industrial Design education, Jeff was a mechanic by trade, and an experienced vocational school student. This experience exposed him to the world of tools and shared-use workspaces within an educational context; a background that proved immensely informative to my research process. Following this session, I conducted a second longer-format session involving both Deb Scott and Nate Gorgen. Deb and Nate were able to offer a deeply informed insight from the perspective of the instructor, which contrasted Jeff's in a way that contributed to a holistic understanding of the concerns from both the student and administrator.

Both Jeff and Nate validated an interest in the application of NFC technology, as they were able to recall a number of applications for it elsewhere on the market. This validation, along with some prior research about the chip footprint and unit cost established a confidence in my use of the technology going forward. Additionally, with regards to the physicality of the concept, it was made clear that the form factor would need to be reconsidered, as Deb initiated discussion on the safety hazards associated with introducing a wearable within the workshop context. Both Deb and Nate offered insight regarding the liability, and safety concerns that currently justify the ban on all jewelry-like accessories when in the workshop facility. Essentially, it is of utmost importance that nothing on the body come within close proximity to shop equipment, for reasons that should have been more obvious to me from the get-go. It was at this point I needed to deviate away from the physical watch form factor.

Regarding the features and affordances offered, Nate was really excited about the idea of a smart software for management, data collection and general awareness within the shop. He ultimately suggested that the service was the most valuable prospect within the concept, and that the wearable device wasn't necessary given the service could be offered through an application. All three experts validated that the prospective value of the concept was most deeply rooted in the ability to increase efficiency, awareness and safety as a means to achieve general symbiosis within the makerspace ecosystem. Additionally, Jeff made note that it would be helpful to include a "central hub" of sorts to involve some form of a touchpoint that could facilitate the features offered to managers. From here, my plan was to continue ideation, focusing on the best form factor to integrate the service, while prioritizing the value offered to both the student and staff simultaneously.

reflective discussion

I entered into this project with a broad interest in shared use contexts, primarily because of their ability to afford users access to knowledge building tools, like minded community and educational opportunity. I find my most personal relationship to this dynamic is centered around my experiences within the OSU woodshop, and the great affinity I have for shared workspaces in the educational context. It serves as an environment to embody the "learn by doing" cognitive style, in a way that empowers anyone who is willing to learn, the ability to build and develop skills that can help them create. In its essence, the OSU woodshop is a space for creation, knowledge sharing, and skill development; pillars of immense value to the development of a student. While this specific example is most immediately familiar to me, I sought to approach my background research with a focus on understanding all forms of educational makerspaces, from highschool woodshops, to university fab labs, professional trade schools and privatized membership-based spaces alike. A common underpinning that guided my research was the understanding of a commonalities between these spaces, as types of makerspaces under the "makerspace" umbrella. This approach allowed me to discern the vital aspects of the space, and the fundamental considerations to be made on behalf of the student and admin user. Furthermore, I bucketed the users into these two groups, in order to ensure the final design proposal would be derived out of consideration for both types of critical stakeholder.

Throughout my research I came to find that one of the main hurdles faced by these types of shared use makerspaces and the users within them, is the lack of streamlined organizational infrastructure that works for both the students and administrators alike. Being that makerspaces can be anything from a school woodshop, to a dedicated professional shared space, It became clear that there was an opportunity to build a common platform for these shared spaces to operate within. My project seeks to address that need, by providing a simple, efficient, and accessible digital space to facilitate the operation of these shared use contexts. I decided that the most meaningful approach would be to design something that could be applied to any of these spaces, rather than for one space in particular. Approaching it in this way could allow a product system like Hive to be scaled across the world, in a way that could benefit a highschool woodshop similarly to a professionally equipped fabrication lab.

Design as a practice is a highly suited framework of thought through which to approach this problem space. It is a field primarily concerned with the interactions and experiences between people, products and systems of various scales. It was immediately clear that I would need to prioritize the involvement of experienced stakeholders within the context of focus, spanning the various roles they play in this setting. The shared use makerspace as an ecosystem, is inherently centered around the interactivity between users and the objects they come into contact with in the space. While this poses a great number of challenges to consider, it proved to be an opportunity to design for connection, education and empowerment. For this design project to be well considered, it would need to address each of the following.

I approached my research process in a few stages, starting with the identification of specialized experts that would be accessible to me via zoom conference calls. I decided that I would need to tap into the experience of a makerspace educator, an experienced shared-workspace student, and a makerspace shop manager. By leveraging the experiences of each of these roles, I would be able to identify concerns and insights respective to each individual's place in the shared-use ecosystem. This methodology would be in line with the goal of the design proposal, which necessitated the consideration for each user group within the context. My first expert was Jeff Forsythe, a coworker of mine within the Industrial Design department at Stanley Black & Decker Inc. I chose Jeff because he was a professional mechanic for nearly ten years prior to his Industrial Design career, and spent multiple years within vocational school programs directly out of high school in addition to his design school shop experience as an undergraduate student. Jeff was able to deliver in-depth insight regarding the

reflective discussion cont.

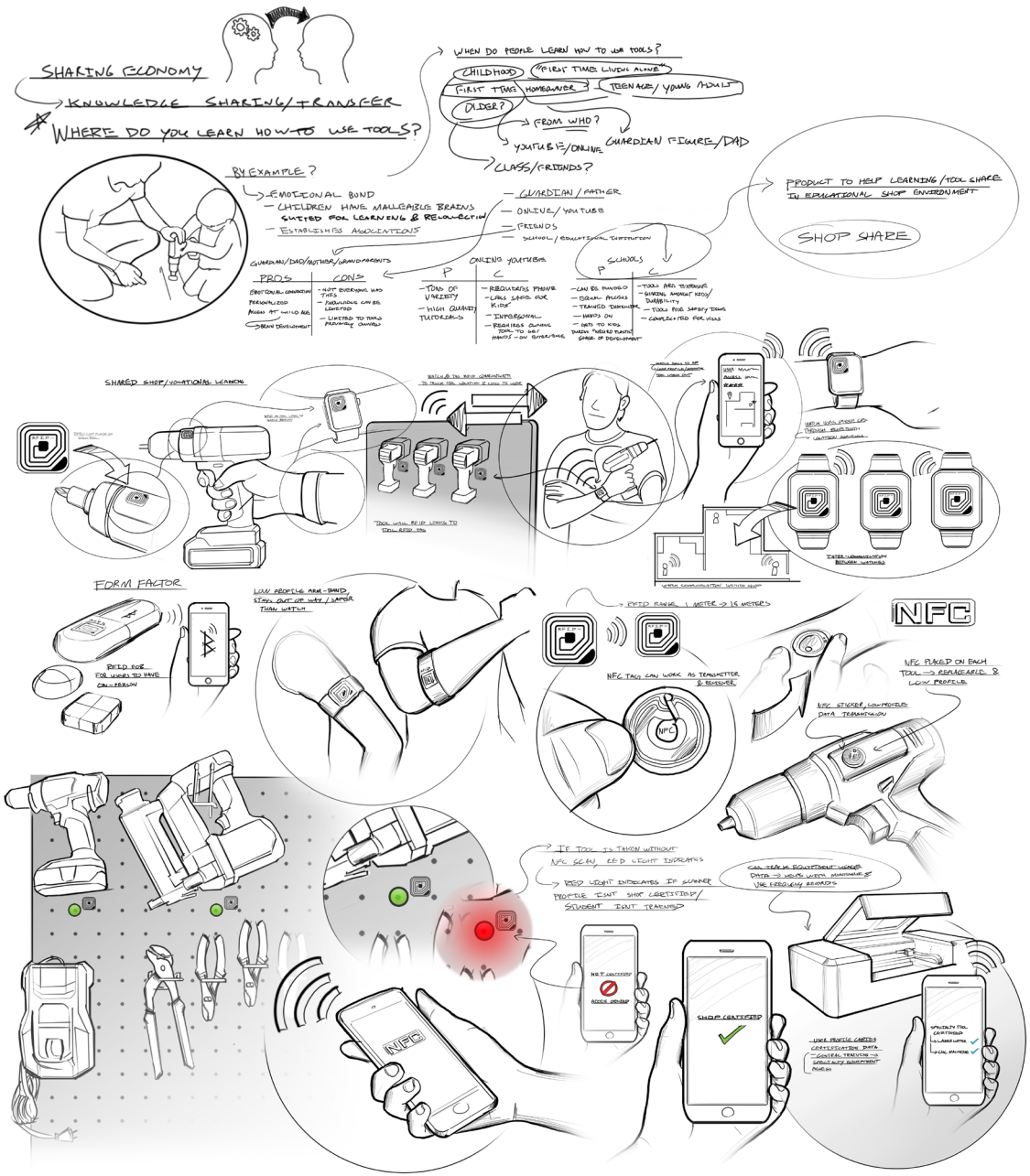
challenges faced as a student within a shared-use educational space, while also considering the ways in which the spaces he experienced could be made more efficient and equitable from a design perspective. The second expert on my list was Deborah Scott, a design educator and master woodworker, who was able to offer a great deal of insight from the teacher's perspective, while also drawing from her experiences as an art student where she spent most of her time wood-working in her undergraduate program. Lastly, I involved Nate Gorgen, the shop manager at The Ohio State University wood & fabrication shop. Nate was able to provide the most directly insightful feedback as he was experienced as a student, shop manager and educator within an educational makerspace.

After gathering my group of experts, I conducted three separate semi-unstructured interviews based on a variety of question prompts I used to engage the conversations. I allowed the participants some flexibility in steering the direction of dialogue, as this initial interview was primarily to gain the most wide spanning breadth of information as possible. Reflecting upon this process, it was certainly an effective way to catalyze some ideas about what could be looked into further, however the nature of a zoom call is relatively impersonal and intangible, so in an ideal post-covid world I would have liked to prepare a more engaging make-tool style session with each of these experts to facilitate a more interactive experience. Following these initial sessions, I re-convened with the experts to conduct an evaluative assessment on the concepts developed later in the process. Overall, looking back I feel confident that I was thorough in capturing the viewpoints from each of the perspectives involved in a shared-use makerspace context. If I was to revisit this research process to extend the breadth of insights gathered, I would like to observe and interact with the OSU shop students as they are working, in order to get a better sense of how they interact with one another, as well as the shop administrators during different times of the day when occupancy levels tend to fluctuate. The restrictions imposed as a result of the pandemic certainly limited my capability to do this, but I feel that if that hadn't been a factor, it would have been to my benefit to do some third person observation, to supplement all of the first-hand inquiry I based my research process around.

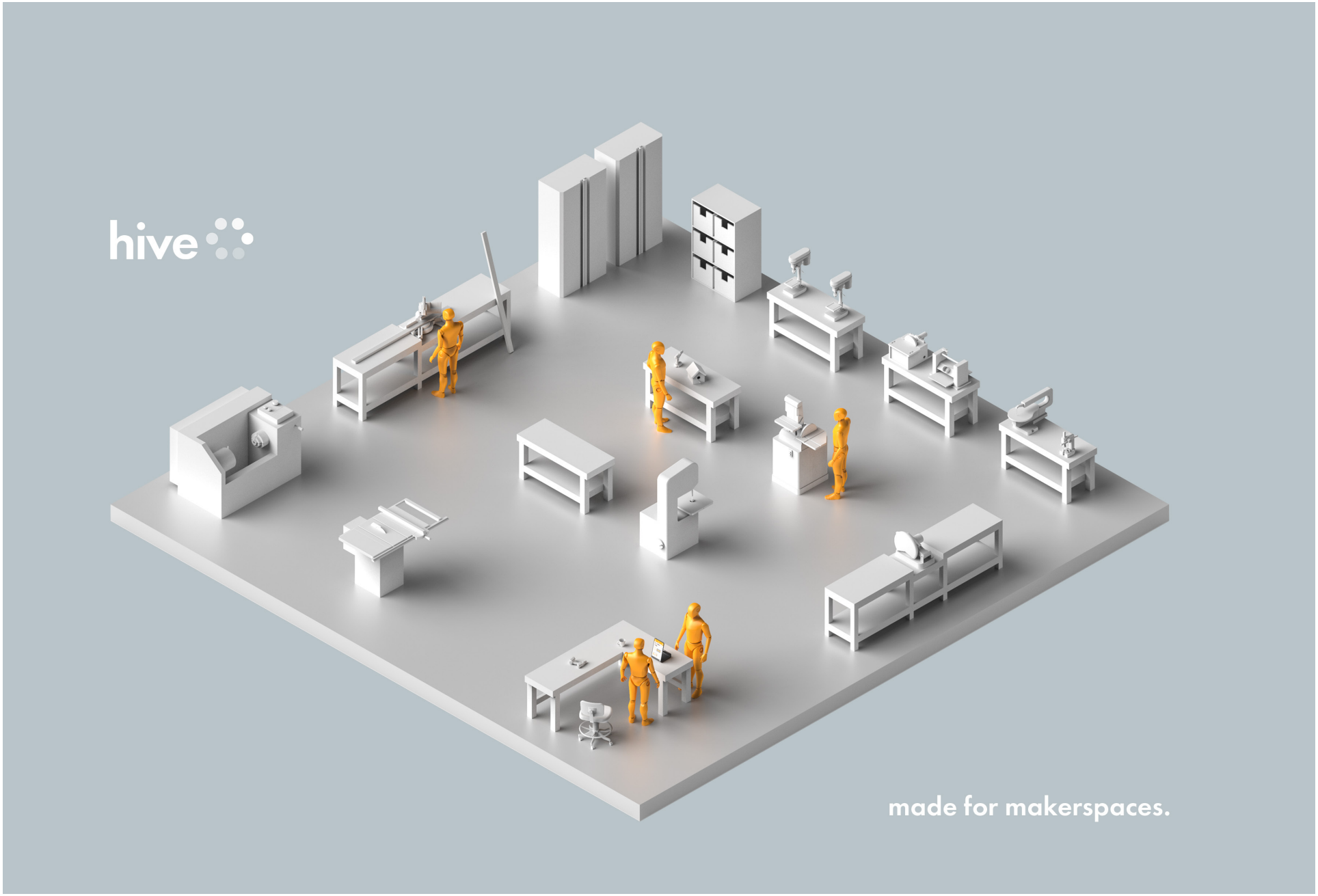
Looking forward, I think what I learned most about my approach to this design challenge is that the nature of design is to always build upon and improve as knowledge grows and technology develops. For this project specifically, I can imagine how revisiting the research stage in order to observe an active makerspace filled with students may benefit my early process. It would have been immensely valuable to speak with students on the spot, in order to assess their step by step processes, workflow habits and preferences while working within the space. If I was to revisit this project post-covid, I would certainly try to develop this aspect of my research further. In this vein, I acknowledge the limitations that arose as a result of pandemic restrictions with regards to first hand research processes, however that was in a sense, a part of the design challenge. How does one conduct first hand research in a meaningful way, without being able to interact with participants? There are certainly ways, and there is certainly great opportunity for improvement in this space; that being said I feel that I paved the way for myself or others to build upon my findings and develop future proposals for designing specifically within shared-use makerspaces. I believe these contexts offer a great deal of opportunity to impact students of all types, while providing a space to share ideas, facilitate connection, and encourage creation. As designers continue to explore and innovate for these types of spaces, we can expect to see a greater sense of community within all types of educational settings. Looking forward, I feel that design initiatives geared towards educational environments outside of the traditional classroom, can benefit those students who prefer hands-on learning styles, and if paired with a cognitive development or education-focused researcher, we can make great progress towards providing more deeply enriching learning environments and educational experiences for students of all ages and expertise levels.

concept development: refinement

After recieving and reflecting upon the feedback I got from my expert evaluative assessment, I conducted another round of ideation to further define a direction. I began by exploring alternative form factors to capture the general goals defined in my brief. Ultimatley, I determined that the most logical integration for the digital system would be a mobile application. It would be free, compatible with any smarthphone, utilize pre-existing NFC capabilities within the device, and would add no additional physical items to be lost, broken or impose upon one's ability to work in the shop.



final concept



final concept

final concept: overview

making, together.

hive
/hīv/
noun: ***a place in which people are busily occupied.***
verb: ***to reside in close association***

hive

final concept: overview

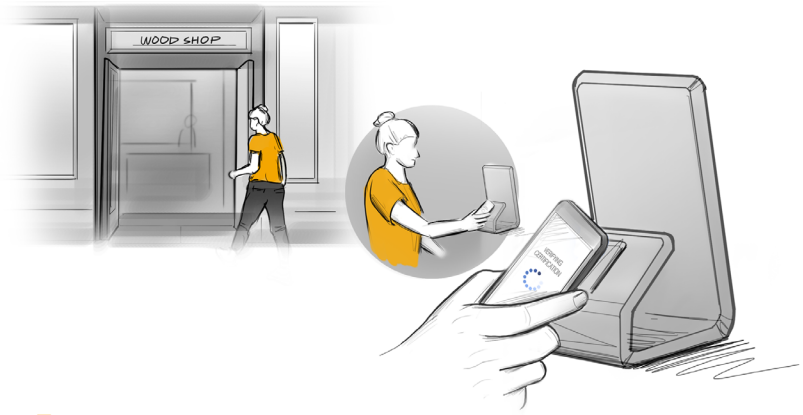
hive is a makerspace management system designed to optimize efficiency, organization and access for both student-users and facility administrators alike.

the hive digital ecosystem is accessible to any active makerspace facilty, through the creation of a designated hivespace. Once a hivespace is established, student-users and facility staff can download the app for free, and create their own individual profile upon setup. From here, they can begin **making, together.**

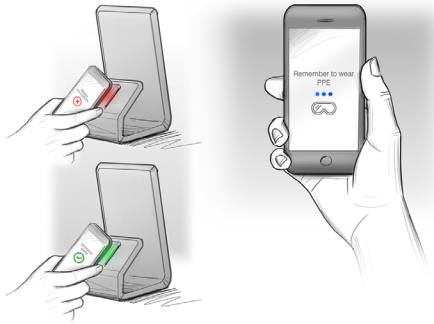
hive

final concept: user journey

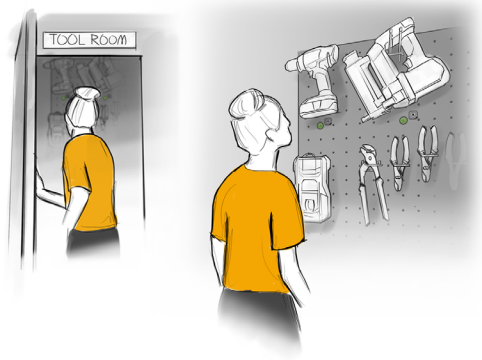
User Journey : check in



1. student enters workshop and checks in at the hive hub located at the front desk



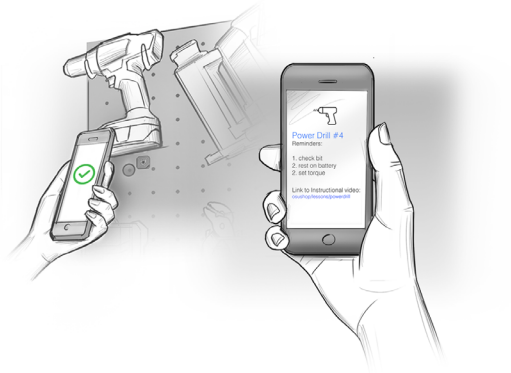
2. during check in, the hive system verifies the user's completion of any shop training required for access



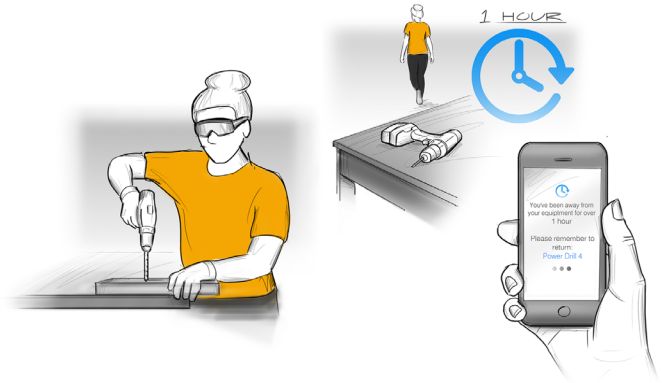
3. upon verification, the user is allowed access to check out facility equipment for use

final concept: user journey

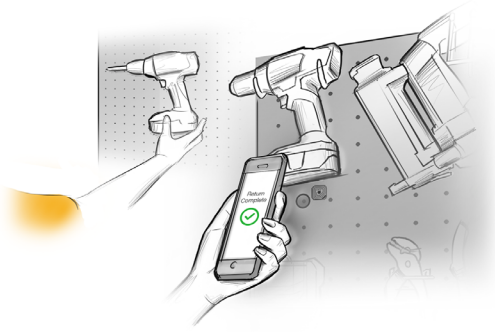
User Journey : equipment check out



4. upon equipment check out, the user is given an at-a-glace summary of tool-specific safety and usability info



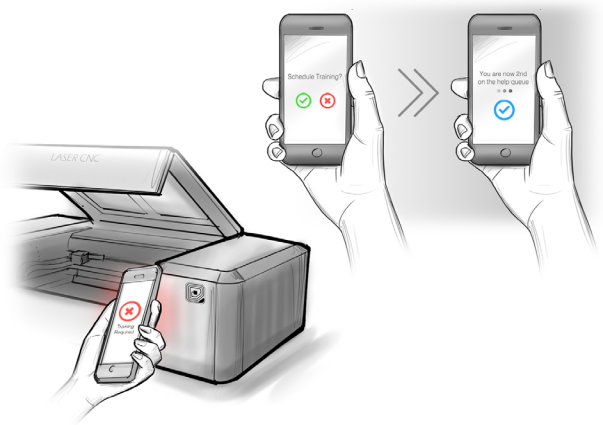
5. the user is then ready to get to work. since the tool's location is linked to their user profile, they will be reminded if their equipment is left unreturned



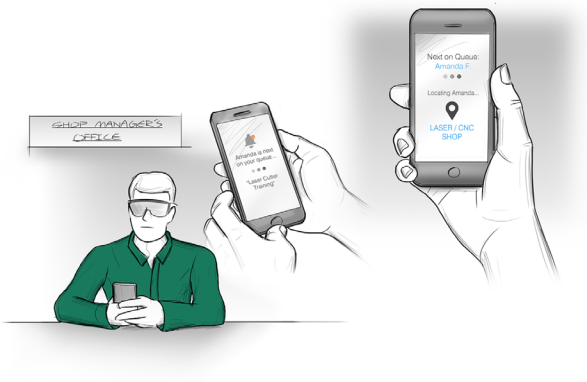
6. upon equipment return, the inventory system updates the item's location, checking it back into the tool room

final concept: user journey

User Journey : assistance seeking



7. when a student attempts to use item the requires special training for access , they will be provided the option to schedule training through the hive app



8. through the hive app, the facility manager will be able to manage all assistance requests and scheduled trainings at their fingertips

9. the shop manager can use the app to efficiently locate the student and fulfill their assistance request

final concept: app

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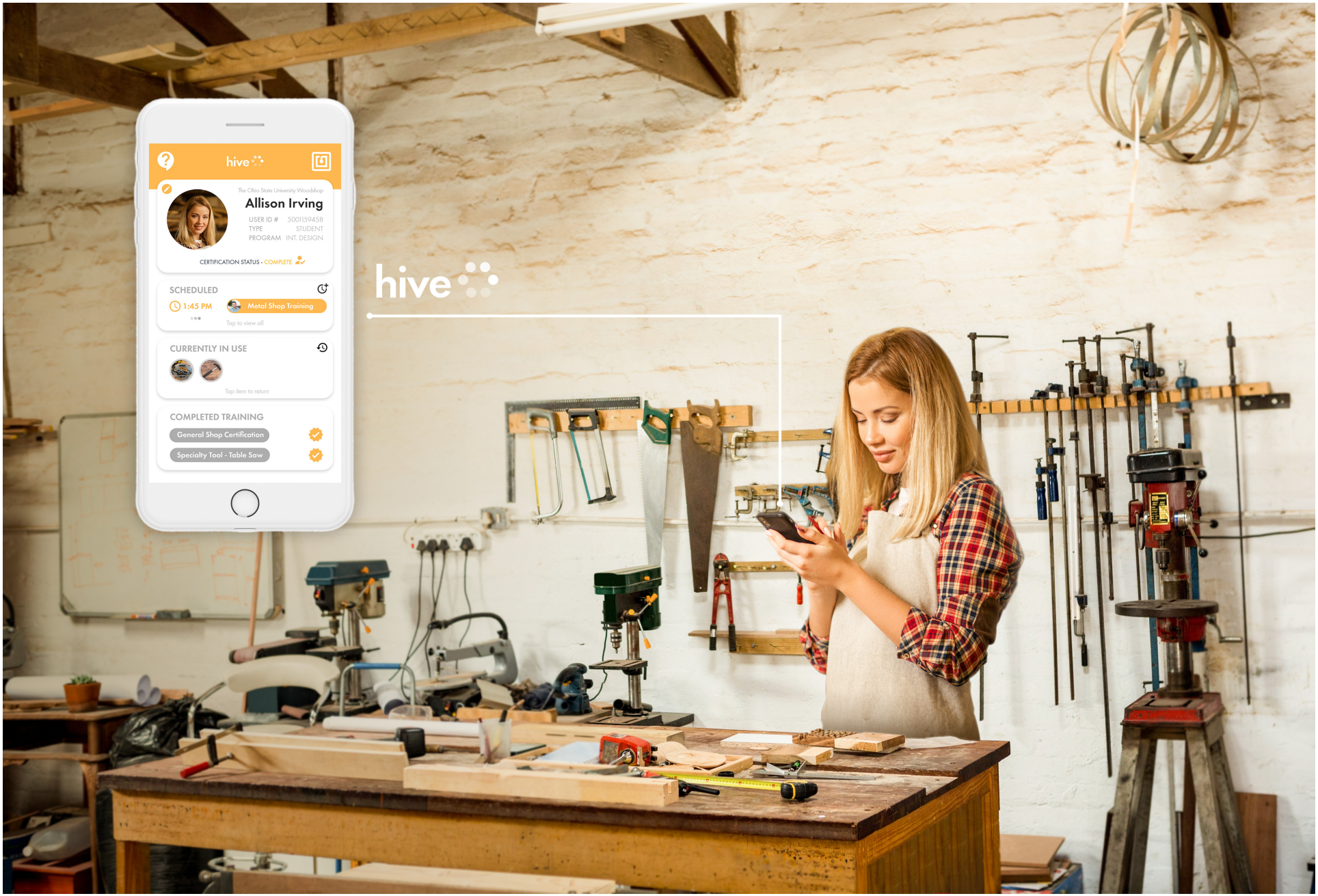
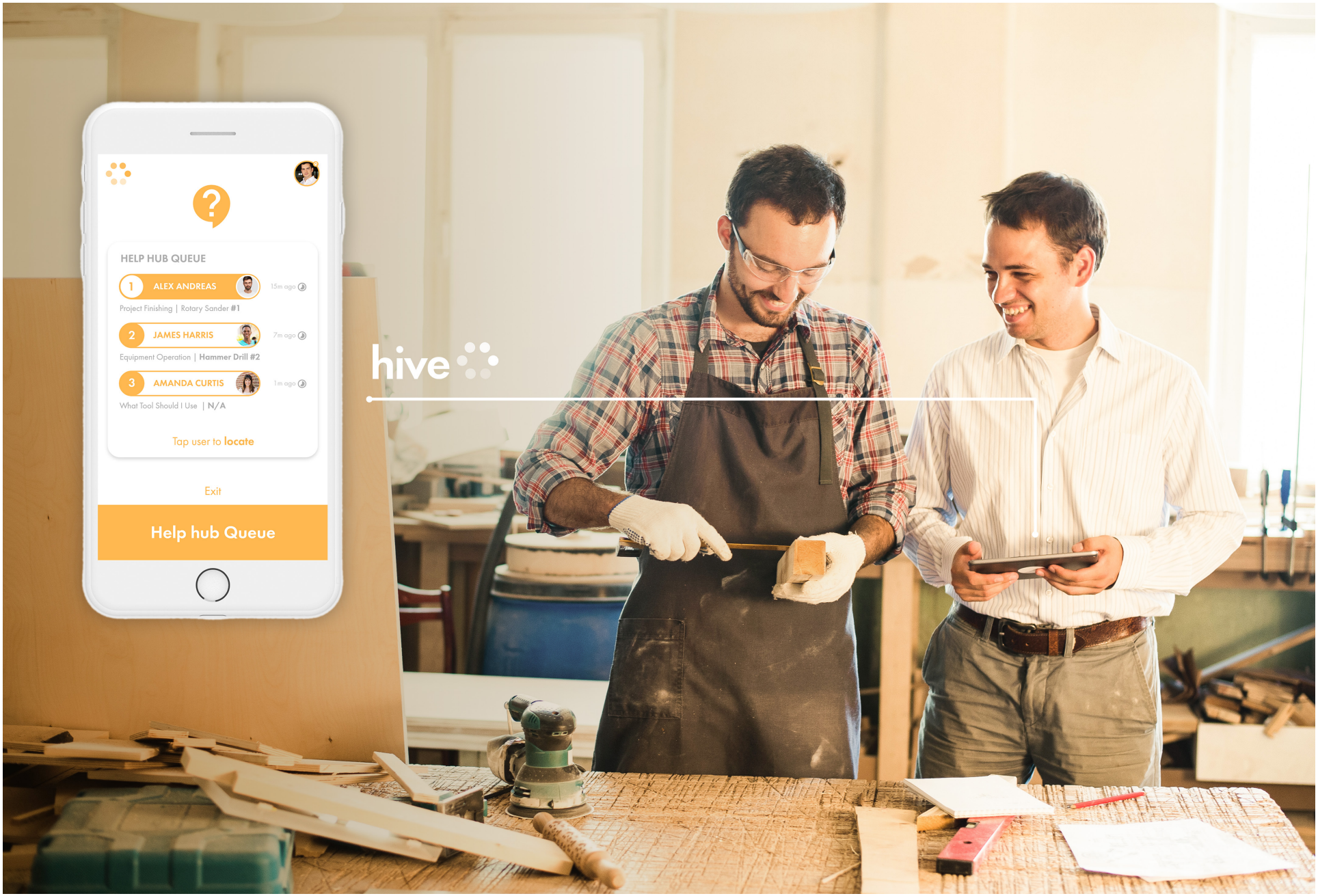
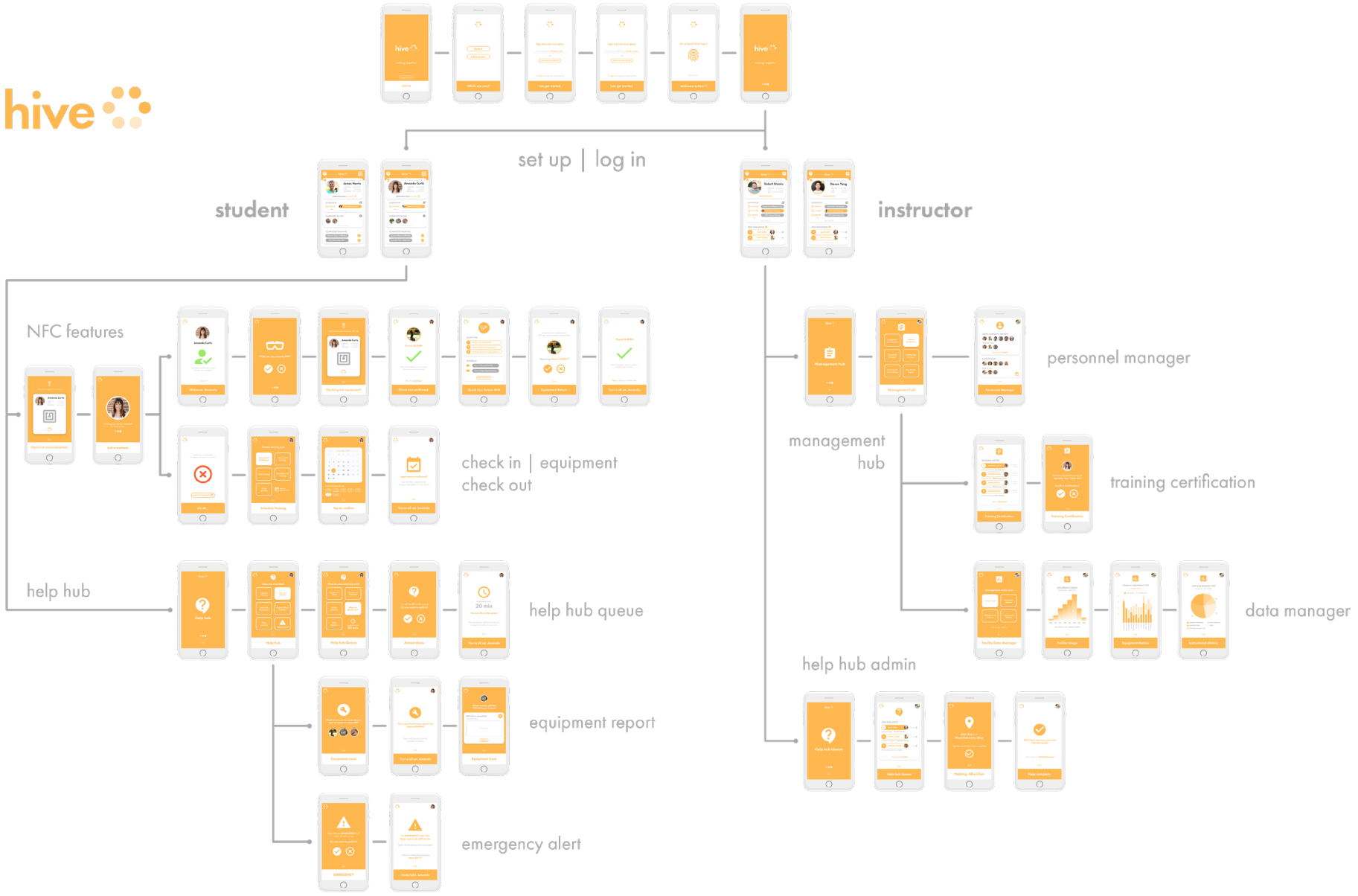


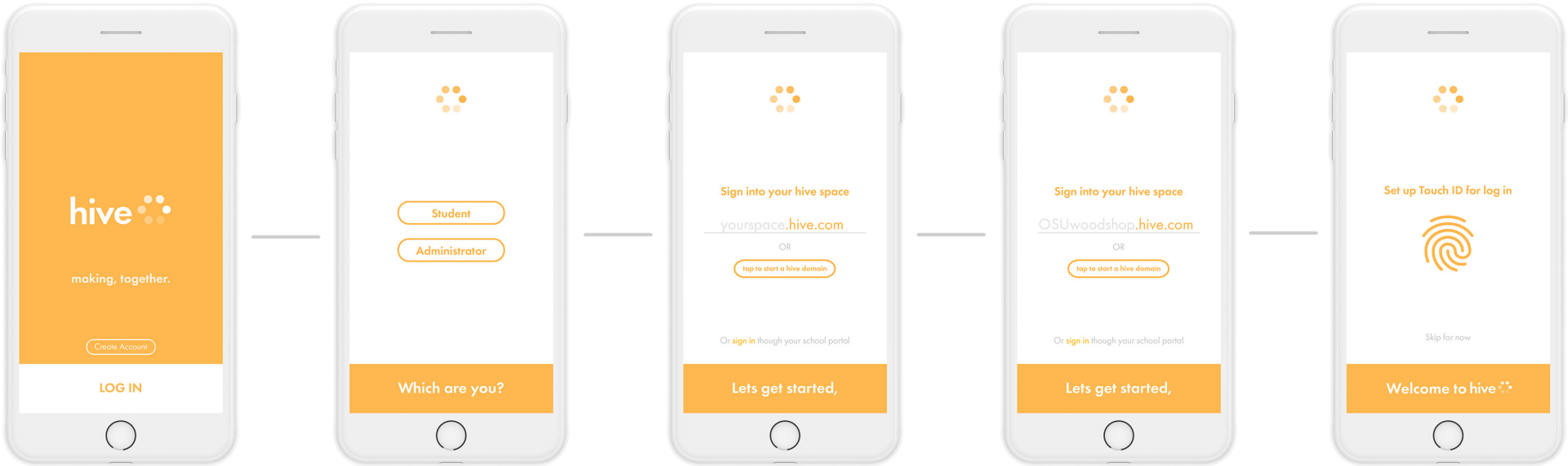
final concept: app



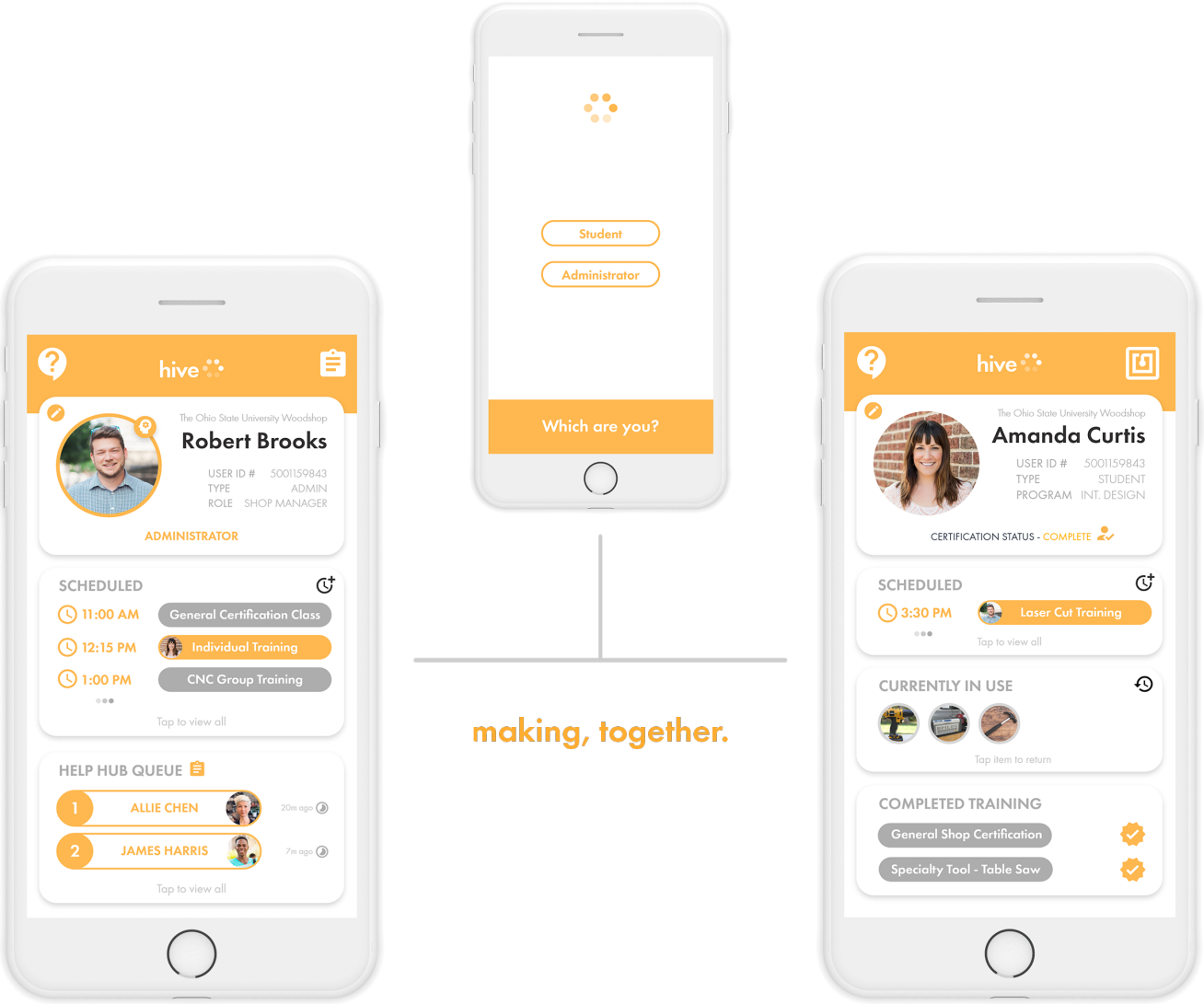
hive app: interface architecture



hive app: set up



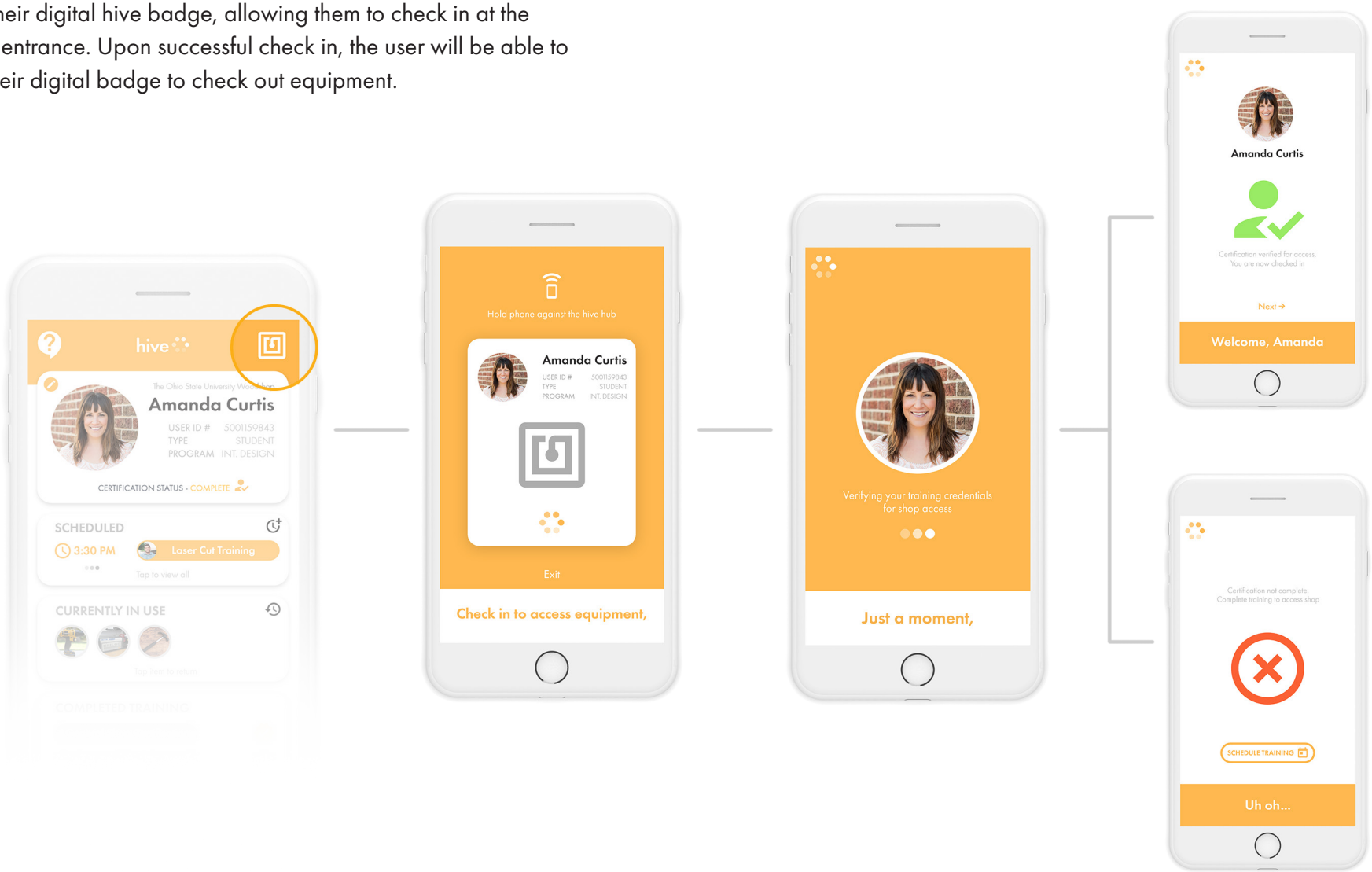
hive app: student + admin



making, together.

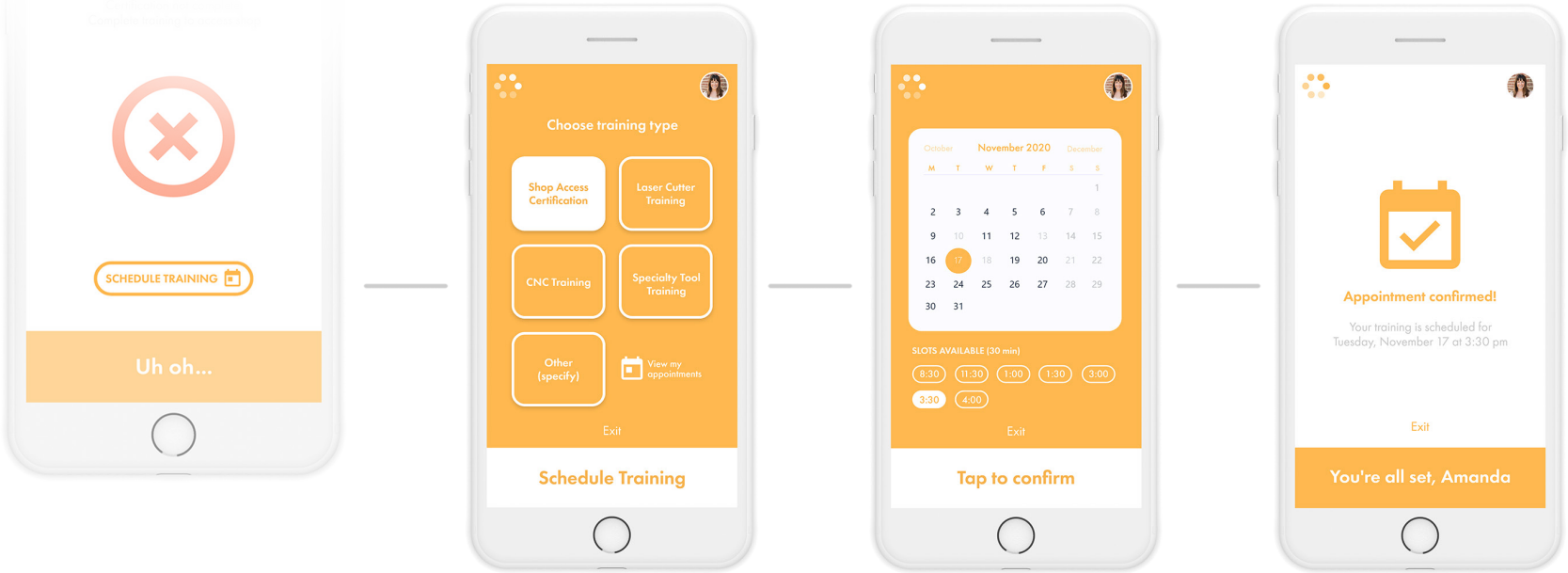
hive app: check in

Once logged into hive, the user can view their individual home screen. From here, the student will need to tap the NFC icon to open their digital hive badge, allowing them to check in at the facility entrance. Upon successful check in, the user will be able to scan their digital badge to check out equipment.



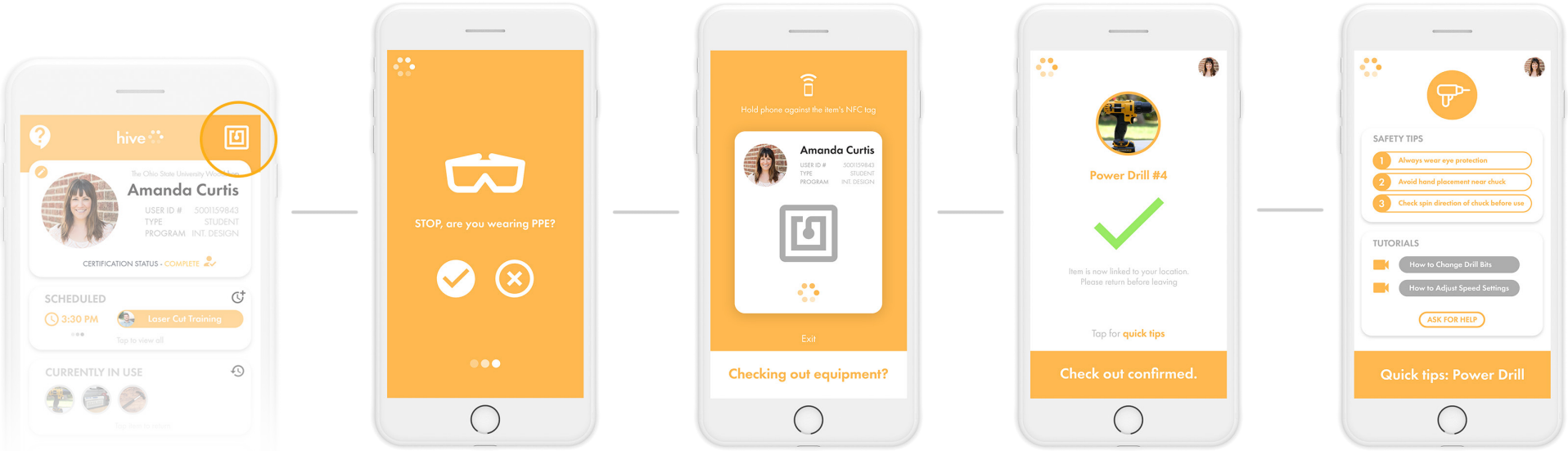
hive app: scheduling

In order to access the facilility, each student-user must check in to prove completion of general practices & safety training. If the student's profile indicates that this certification has not been completed, they will be given the option to schedule necessary training(s) within the scheduling portal of the hive app.



hive app: equipment check out

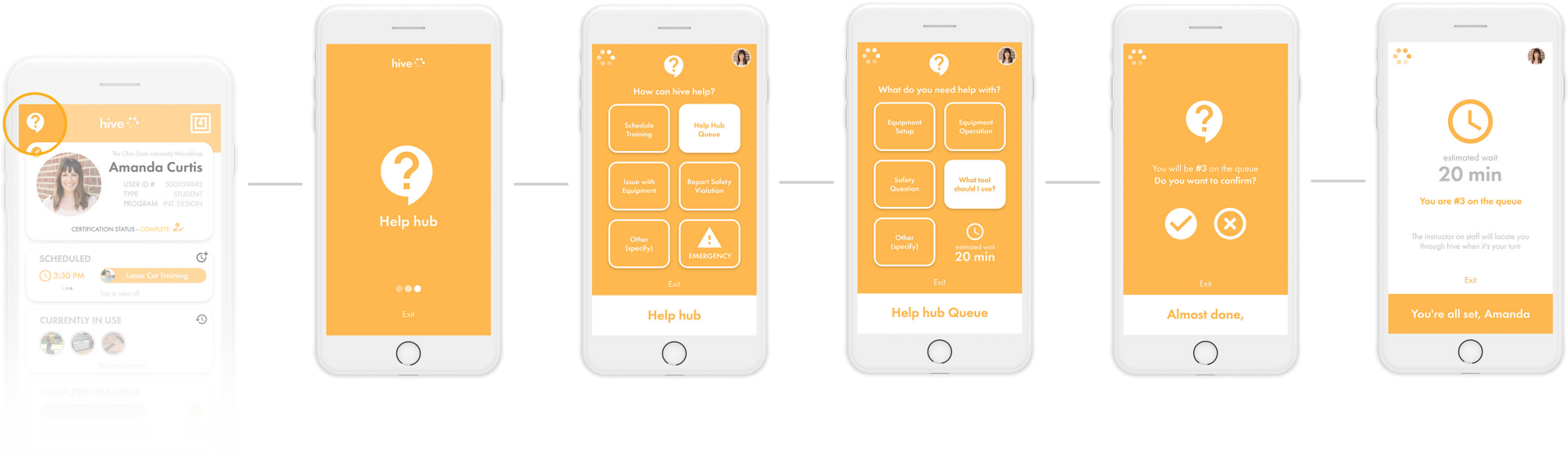
Following the initial check in, the user can begin to check out equipment using their digital hive badge. The badge utilizes the smartphone's NFC capability to communicate with NFC chips applied to each piece of equipment.



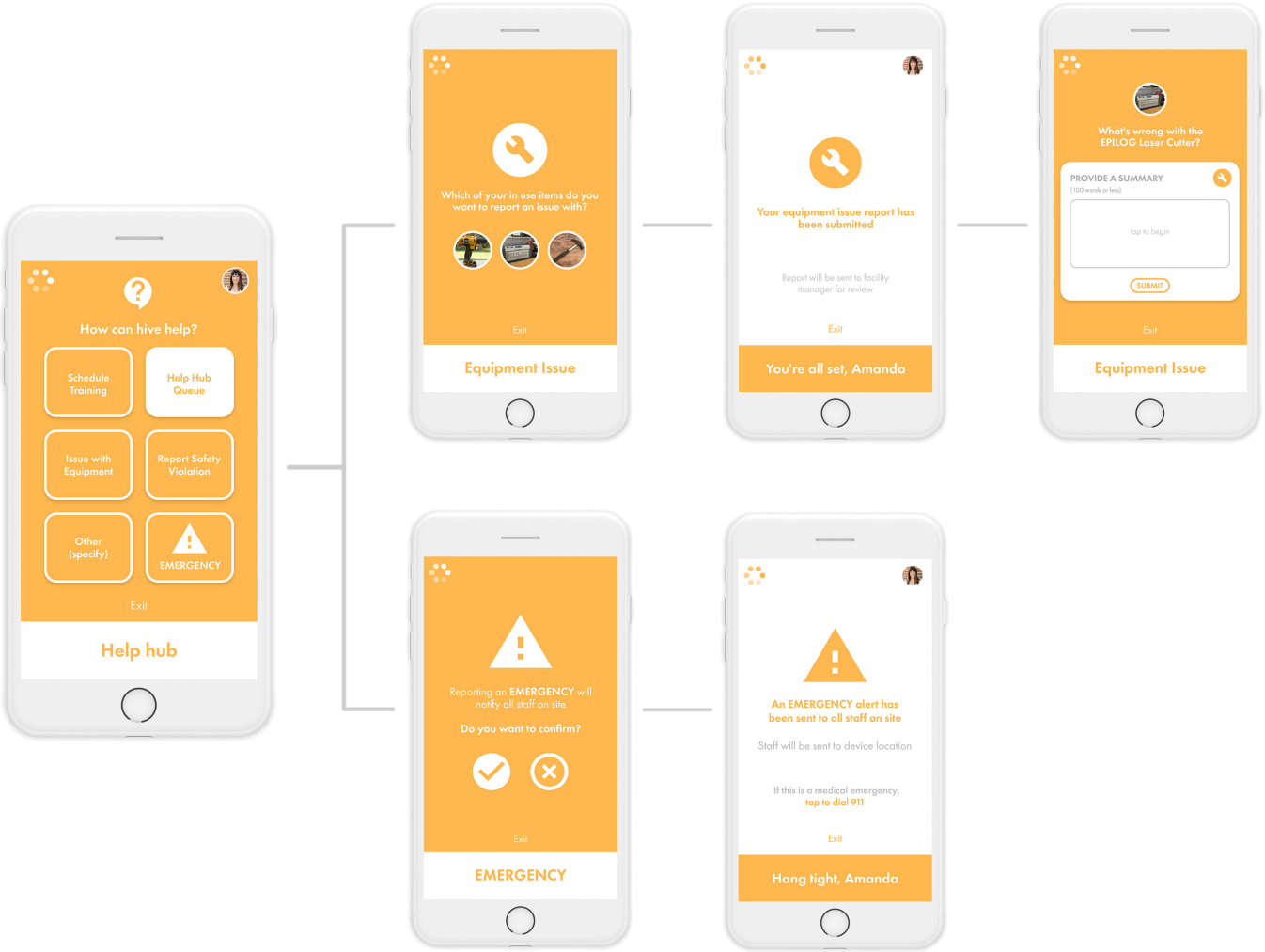
hive app: equipment check out

hive app: help hub

The help hub is an easily accessible resource for students to ask for assistance. They can join the queue, get an idea of how long they have to wait and recieve the guidance they need to work safely and effectively.

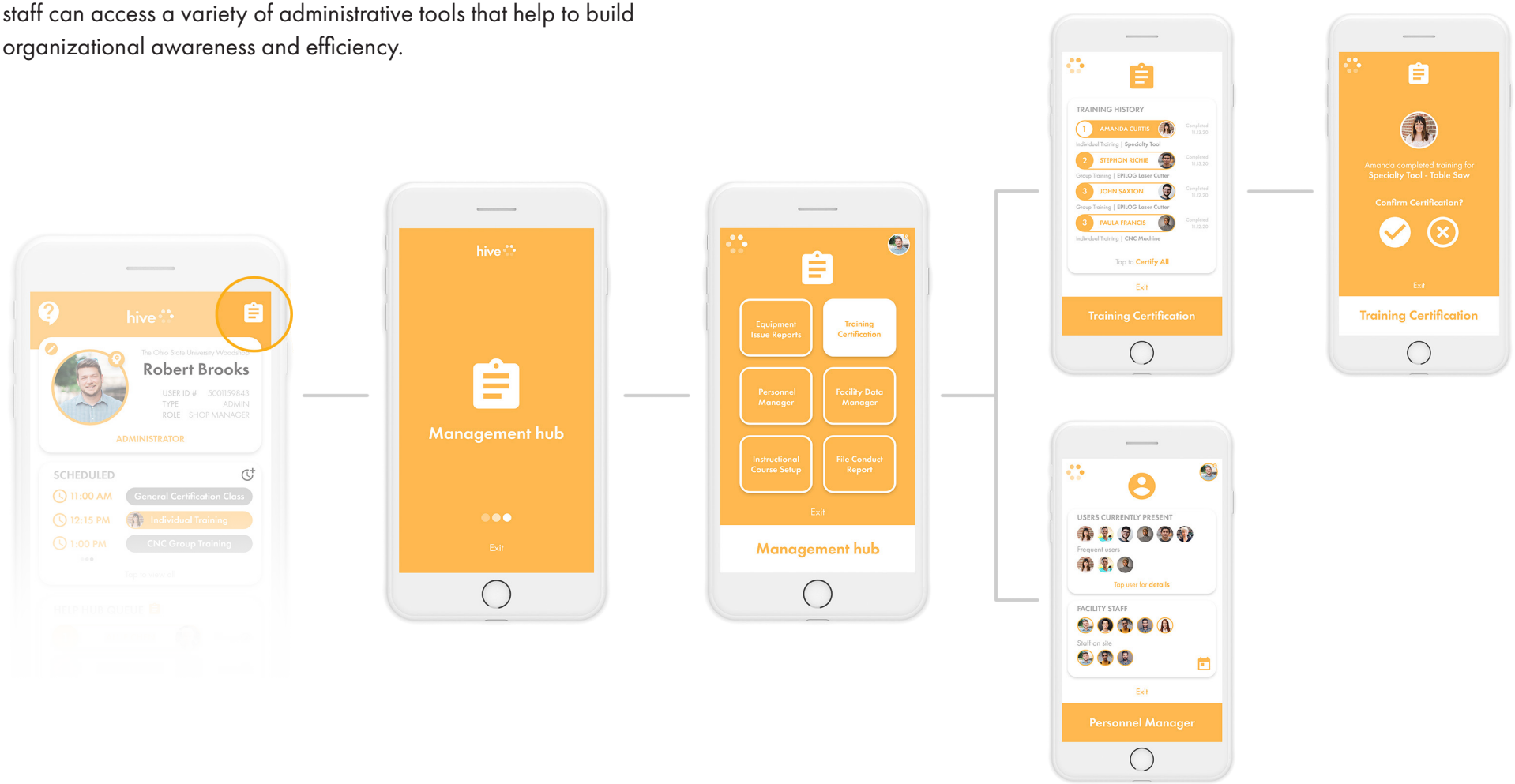


hive app: help hub



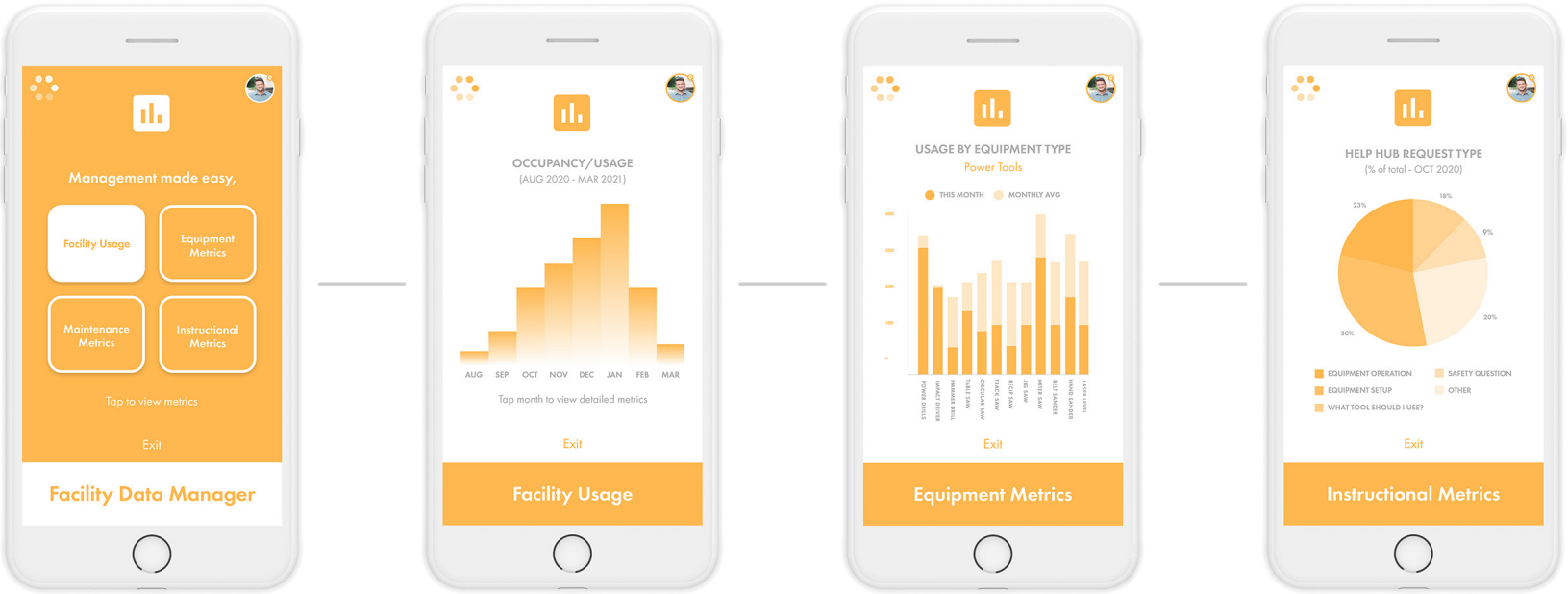
hive app: management hub

The management hub is a feature specific to administrator profiles within the hive app. Through the management hub menu, facility staff can access a variety of administrative tools that help to build organizational awareness and efficiency.



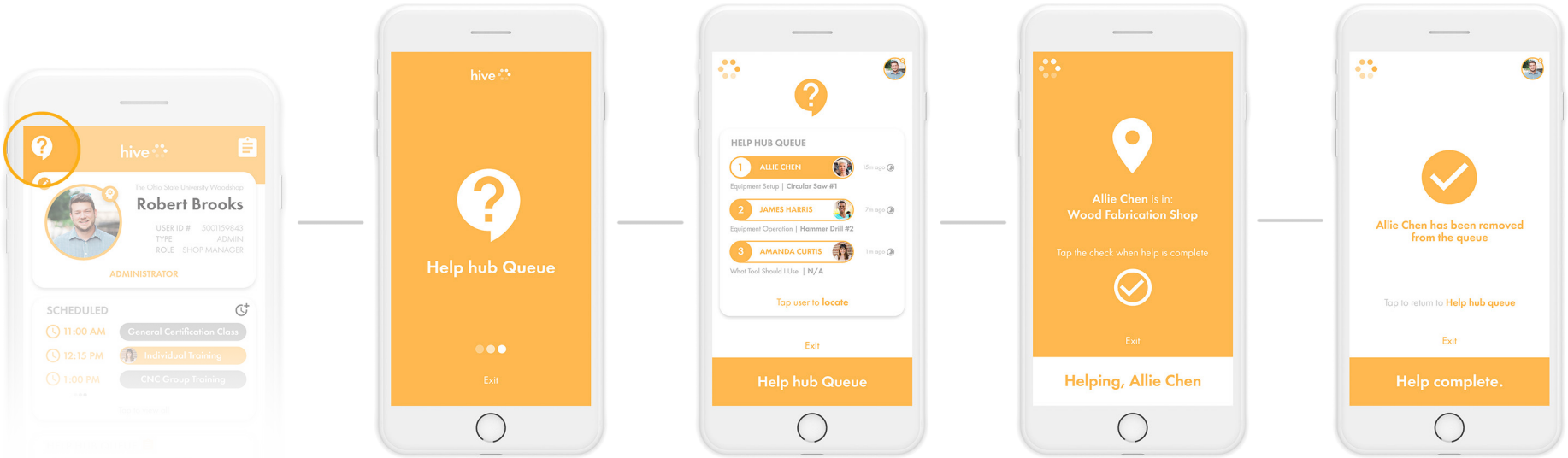
hive app: data manager

Nate Gorgen, the shop manager within the OSU woodshop, expressed interest in the capability for data storage that would result from a digital system of this type. He pointed out a variety of cases in which this would allow for better supervisor awareness, inventory tracking and preemptive logistical efforts. The facility data manager within the hive management hub, is a direct answer to Nate's insight.

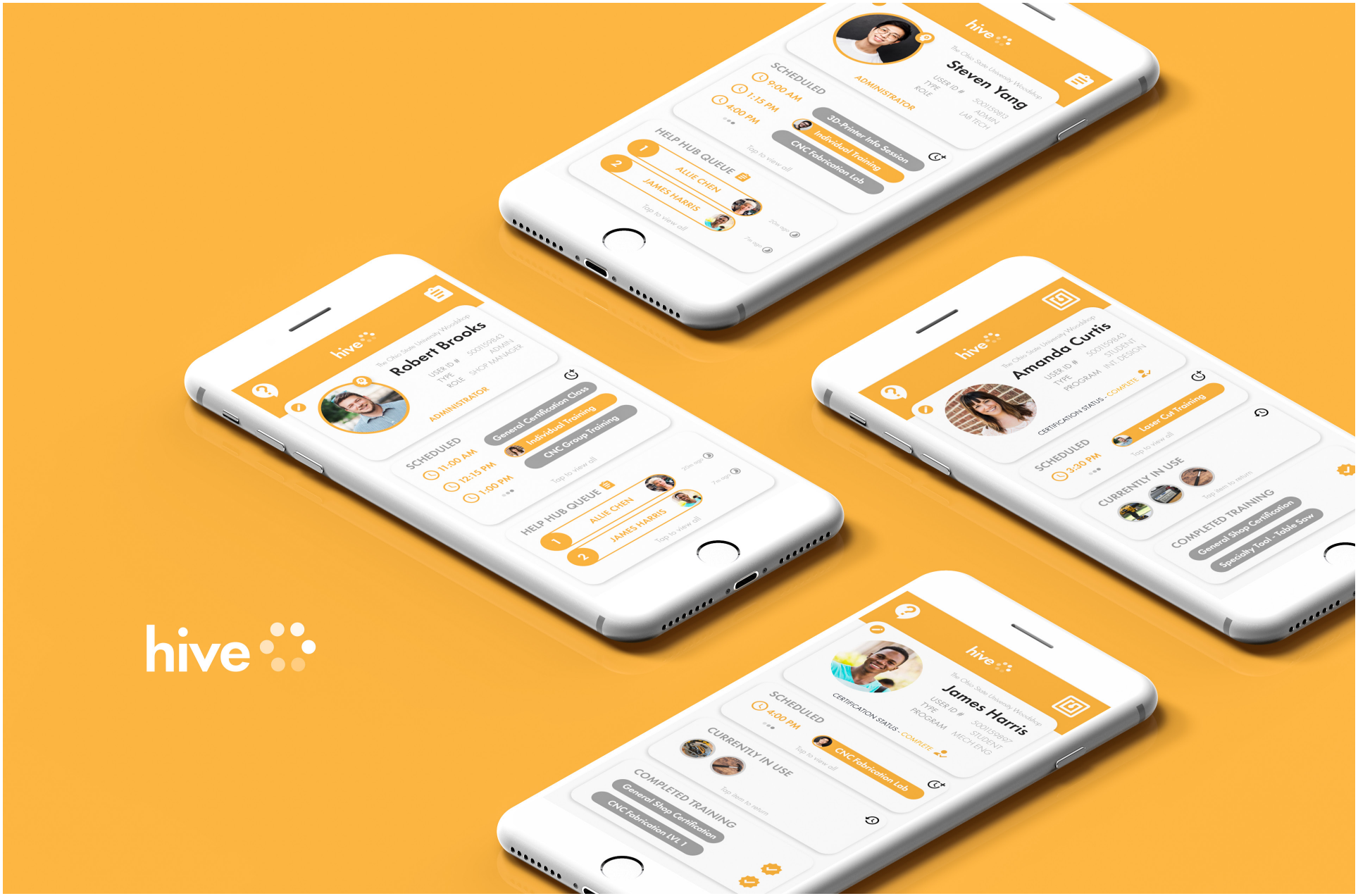


hive app: help hub admin

The admin side of the help hub queue is an organized way for facility managers/ instructors to provide first-come-first-serve assistance to students. Student users join the queue from the hive app when they need help, the system then provides a list of requests in the order they came for the shop manager to complete. Once complete, the instructor can verify the certification in the management hub, adding the credential to the respective student's profile.



final concept



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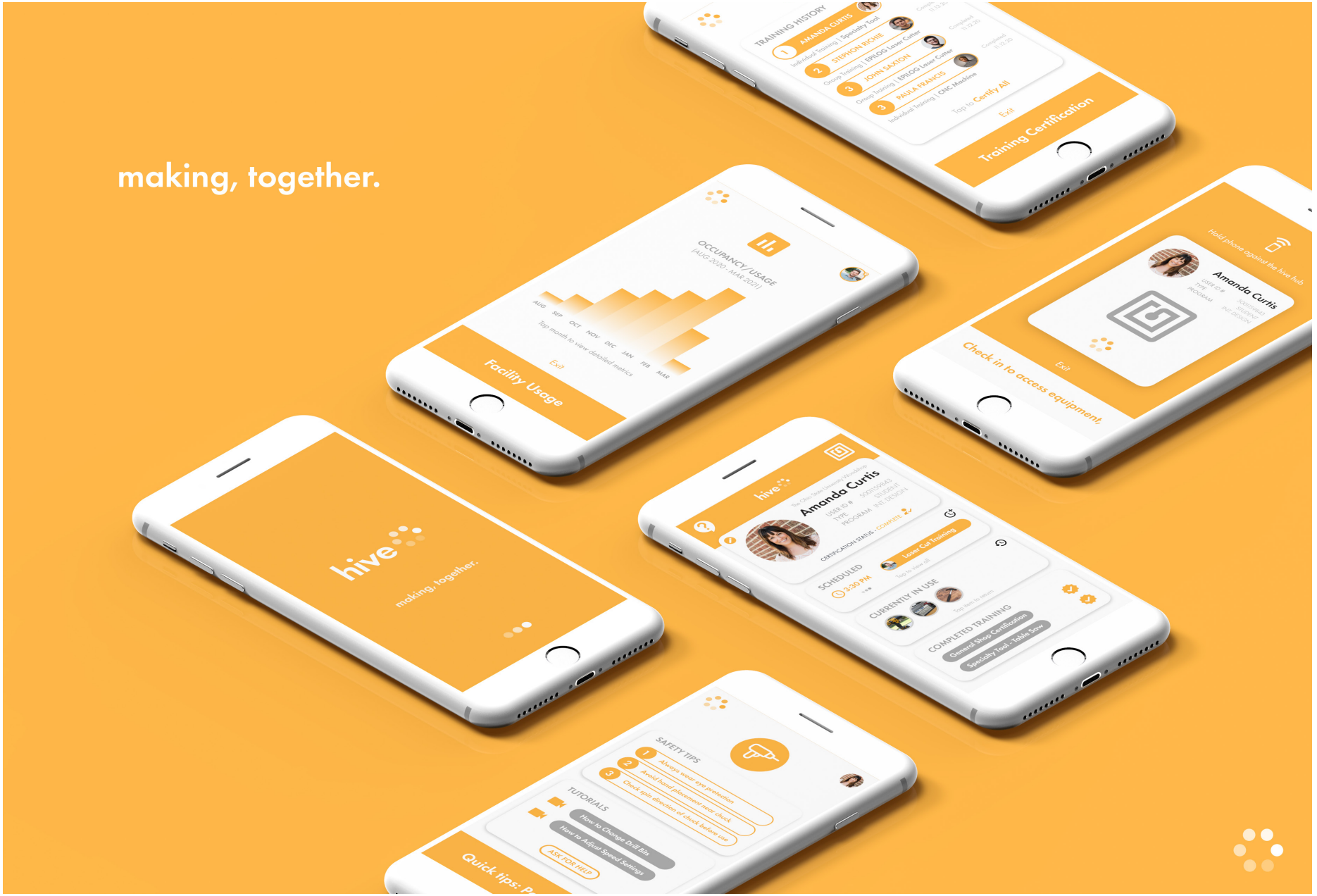

final concept: hive HQ

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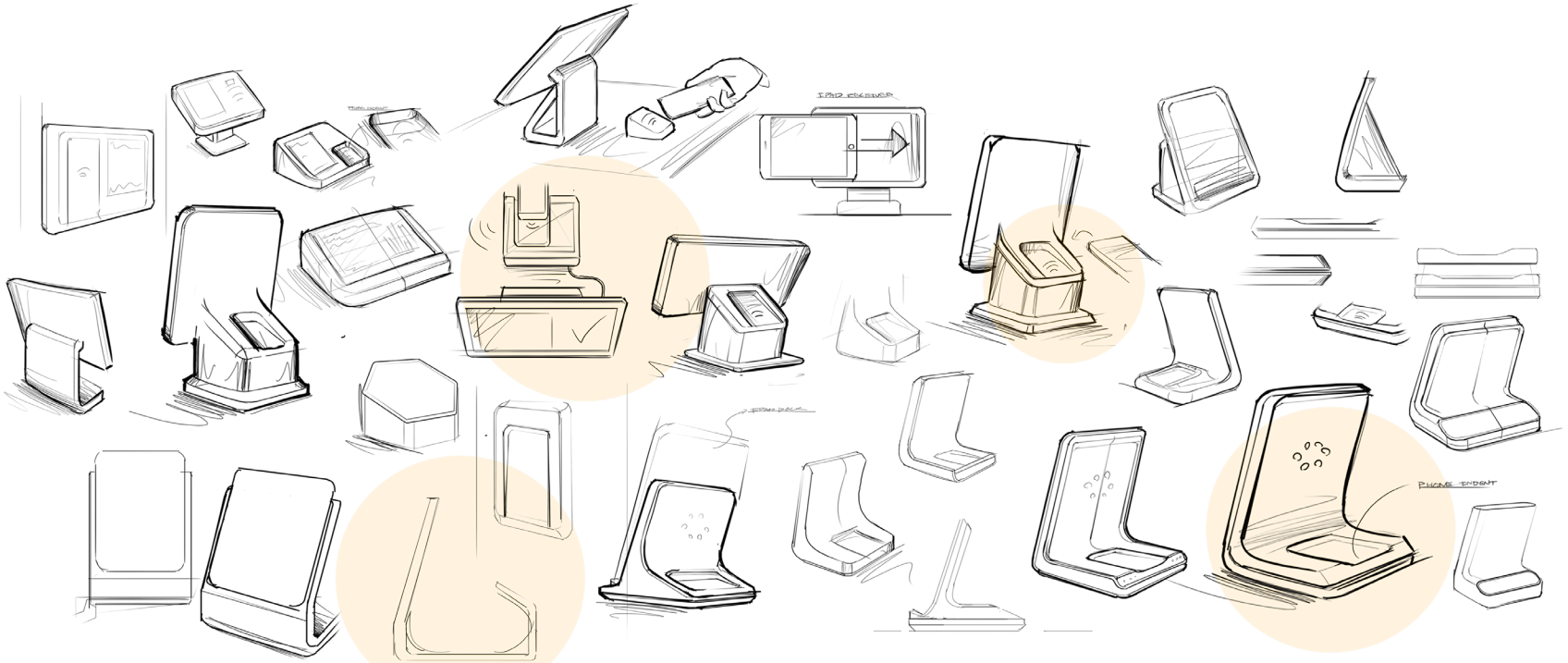
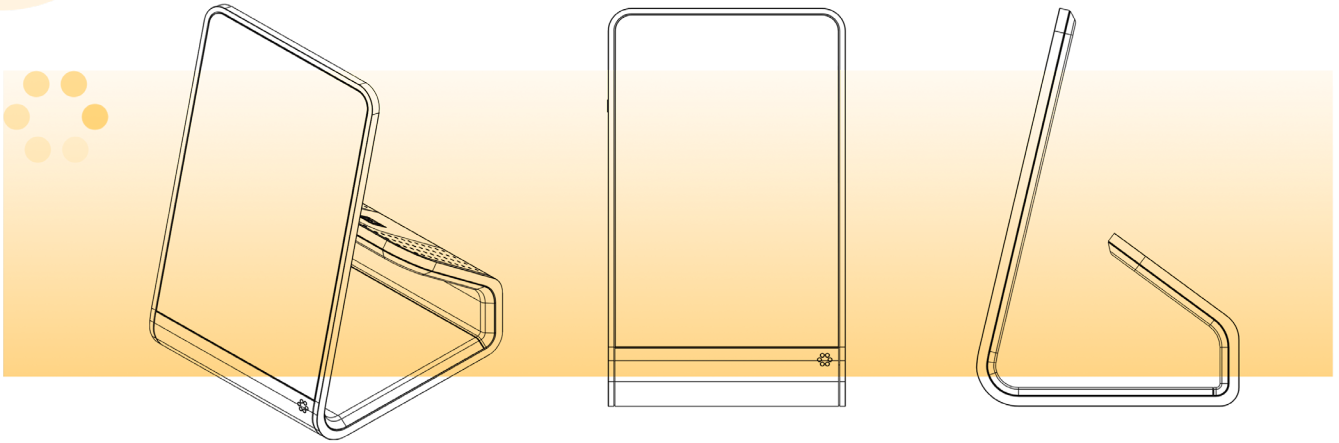
hive HQ is a central hub designed to fascilitate student-user check in, while acting as a tool for facility managers to handle administrative tasks and view organizational information while at the facility entrance.

hive

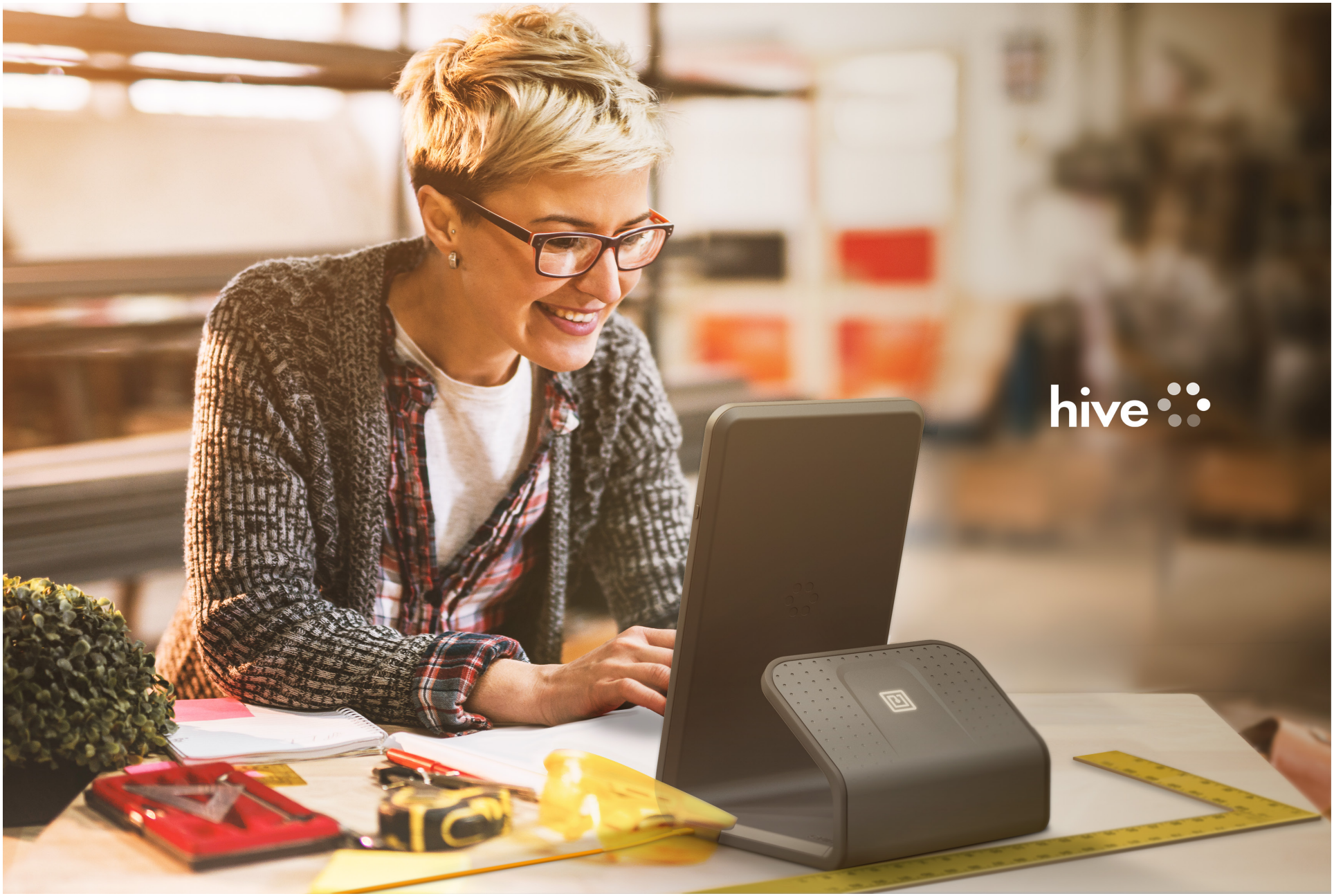
final concept: hive HQ





form development

final concept: hive HQ



final concept: hive HQ

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thanks.


hive
USERS CURRENTLY PRESENT
STAFF ON SITE
SCHEDULED
11:00 AM
General Certification Class
12:15 PM
Individual Training
1:00 PM
CNC Group Training
Tap to view all
HELP HUB QUEUE
2
ALLIE CHEN
20m ago
2
JAMES HARRIS
7m ago
Tap to view all
hive
making, together.